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Mark Terrill
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Knowledge and Information Technology

SYMPOSIUM

With contributions from:
RAY KURZWEIL
EDWARD ROTHSTEIN
GUNTHER STENT
GUY BURGESS

ANNIE COHEN-SOLAL
Lévi-Strauss in America

STEPHEN MILLER
and SANFORD PINSKER
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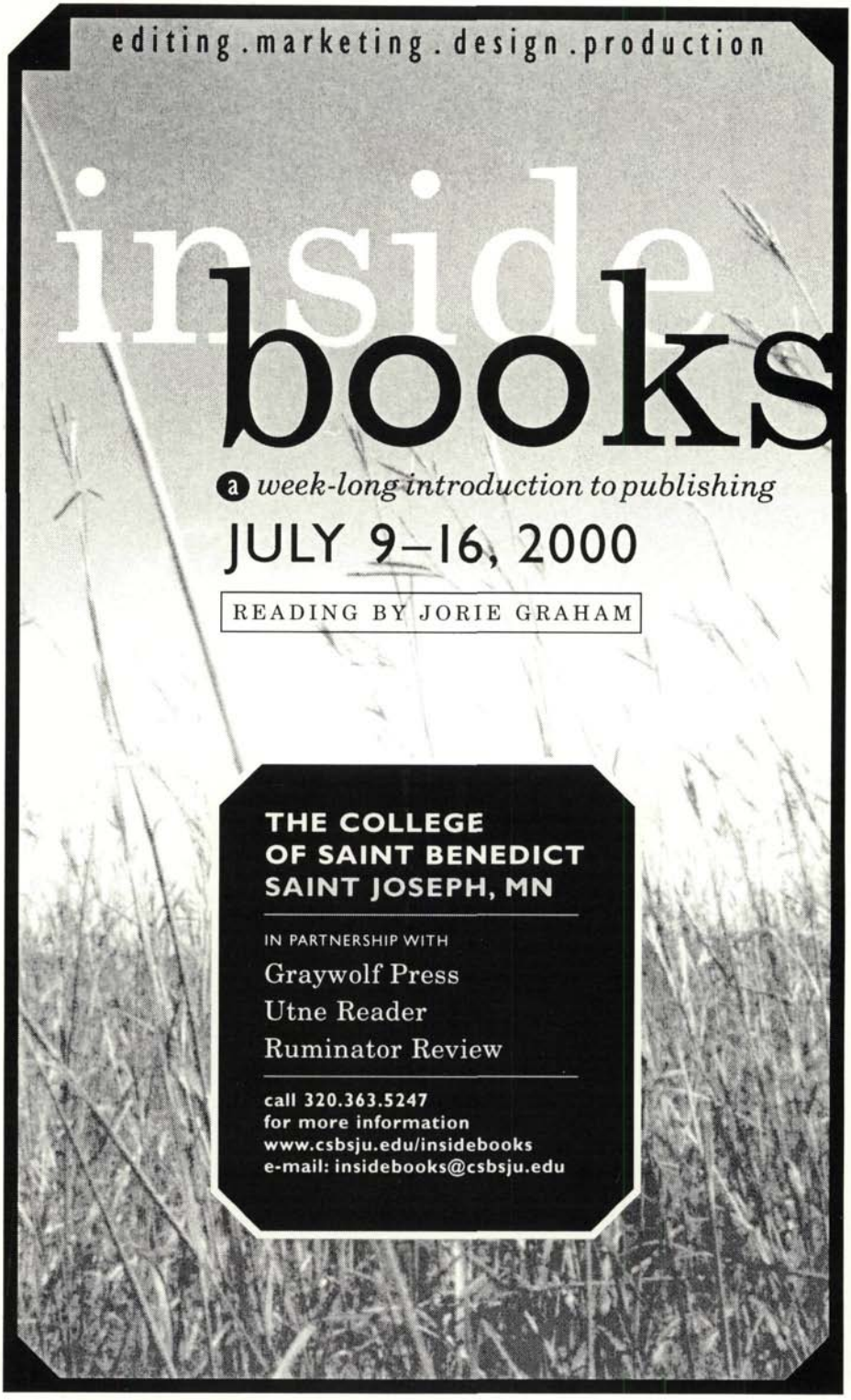

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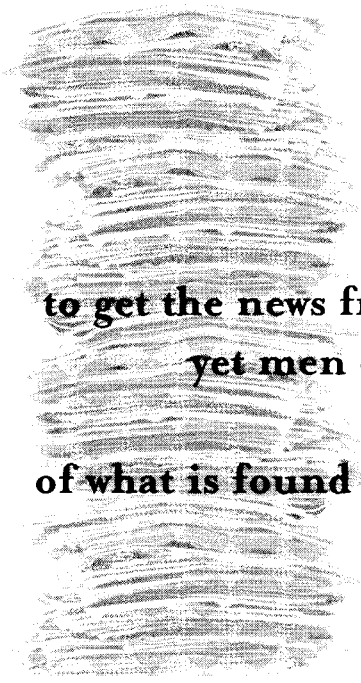

It is difficult
to get the news from poems
yet men die miserably every day
for lack
of what is found there.

—William Carlos Williams

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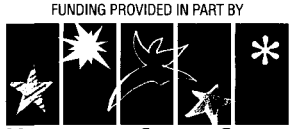

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Editor's note: In the Winter issue of 2000, we should have noted that Denis Donoghue's piece "T.S. Eliot and the Poem Itself" was originally delivered as the Stanley Burnshaw lecture at the CUNY Graduate Center in October, 1998.

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Knowledge and Information Technology Symposium

Session One

Edith Kurzweil: Good morning, I'm Edith Kurzweil, the editor of *Partisan Review*. I will introduce today's meeting.

"Isn't *Partisan Review* going somewhat beyond its usual realm by organizing a conference on 'Knowledge and Technology'," asked one of our closest friends, someone I expect to be here. "*Yes*," I answered, when you think of the words in their narrow sense — as belonging to the other of what C. P. Snow called the two cultures. But *no*, when you consider our larger mission, which is to address and explore trends and changes in the way our societies will function, in how our thinking already has been, and will be, altered, and how computers may well replace and enhance our own brains.

This morning, Ray Kurzweil will tell you about all of that, and about the eventual effect of our inevitable reliance on computers. In his book *The Age of Spiritual Machines,* Ray has predicted what advanced technology may enable us to do during the coming years. Ray is here today not because he is my nephew, but because he is a genius. And due to his current work on voice recognition, and his other inventions, he is the best person to look into what this technology will mean in the future he foresees for us all.

A few days ago, in the *New Republic*, I came upon Robert Lucky's argument that "technologies have a way of losing their dominance." He maintains that in the last century railroads had their transformative effect, as had the invention of the telegraph which, eventually, was replaced by the telephone. And yet, Lucky seems to agree with Ray that Moore's Law — that technology doubles every eighteen months — so far has held true. Still, after questioning whether computers could stop getting better, he thinks that they will "endure in some form through the next century." Ray Kurzweil, however, after selling the last of his companies about a year ago, and allegedly retiring, has started three new projects (he'll probably tell you about some of them), thus proving *Forbes* correct in calling him the "ultimate thinking machine."

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Edward Rothstein, whose background in music and mathematics, and whose incisive knowledge of cultural issues and phenomena is second to none, will comment on and question some of Ray's predictions.

This afternoon we will hear from two persons whose exceptional work could not be pursued without the most sophisticated computers. Of course many of you in the audience have experiences in your own fields, and I hope we will hear about these during the discussions at the end of both the morning and afternoon sessions.

Gunther Stent, a member of the faculty of the University of California at Berkeley since 1952, and the author of a number of textbooks on molecular biology, frequently writes and reviews books on science for *Partisan Review*. He will address questions of consciousness from a neurobiological perspective. Answers to these questions relate to other sciences and depend particularly on the computerization of knowledge.

Guy Burgess, a sociologist at the University of Colorado at Boulder, will tell us how he uses the Internet to strengthen scholarly networks that aim to resolve conflicts by means of new computer and telecommunication technologies. I am especially interested in how his and his wife Heidi's research might be influenced by Ray Kurzweil's anticipations of the impact of "spiritual machines" on moral values.

Richard Grimm, a member of our Advisory Board, is going to moderate the afternoon session. But now I want to present Jacob Weisberg, the moderator of this morning's discussion. He will introduce both Edward Rothstein and Ray Kurzweil.

Jacob Weisberg is thirty-five years old and has written about politics and culture for more than a decade. A native of Chicago, he attended Yale University and New College, Oxford on a Rhodes scholarship. From 1989 to 1994, he worked in various editorial capacities at the *New Republic*. Between 1994 and 1996, he wrote a national interest column for *New York Magazine*. In the fall of 1996 he joined *Slate*, the Internet magazine published by Microsoft, as its chief political correspondent. He is currently covering the 2000 Presidential campaign. Weisberg is also a contributing writer for *New York Magazine*. Previously he wrote for *Vanity Fair* and *Newsweek* in London and Washington, and freelanced for other publications including the *New Yorker*, *Partisan Review*, *Esquire*, *Gentleman's Quarterly*, the *Washington Monthly*, the *Washington Post*, the *Saturday Times of London*, and the *Observer*. In 1996 his book *In Defense of Government* was published by Scribner. Weisberg was also the co-editor with Andrew Sullivan of the 1992 paperback, *Bushisms*. Last, but not least, he comes around in order to read to William Phillips. Jacob.

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Jacob Weisberg: Thank you, Edith, for that introduction, and also for those clear instructions. I will introduce the two panelists. Ray Kurzweil will speak first about some of the issues in his book. Edward Rothstein will have first crack at responding, and then we'll open it up to questions. I might ask a few, and we should have a lively discussion.

In addition to being a genius and Edith's nephew, which should be qualification enough, Ray Kurzweil is an inventor and an author. Here are some of the things he has invented—I understand some of them, maybe you'll understand some of the others. He invented the first print-to-speech reading machine for the blind, the first text-to-speech synthesizer, and the first music synthesizer capable of recreating the grand piano and other orchestral instruments. I was just reading about some of these inventions in his book—it really is fascinating. He devised the first commercially marketed large vocabulary speech recognition system software. He also founded, developed, and sold four companies in fields of music synthesis, speech recognition, and reading technology. All of these companies are still around and all are leaders in their respective markets. Ray has received scores of awards, including the 1994 Dickinson Prize, which is Carnegie Mellon University's top science prize. He has received nine honorary doctorates, honors from two U.S. presidents, and various film awards. His book *The Age of Intelligent Machines*, published in 1990, was named the best computer science book of that year, and his current best-selling book, which I'm sure you've all seen, is called *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*, published by Viking.

Edward Rothstein, the other member of our panel, is the cultural critic-at-large for the *New York Times*, where he writes on cultural politics, literature, music, intellectual life, the arts, and technology. Those are actually only some of the things he writes about; I've been reading "Connections," his column about culture and ideas, for a long time, as well as his column about academic books, called "Shelf Life." And he frequently writes essays for the "Arts & Ideas" section of the paper. Before that, he was the chief music critic and a technology columnist for the *New York Times*, and the music critic at the *New Republic*. We both worked there together. He is the author of a book called *Emblems of Mind: The Inner Life of Music and Mathematics,* published in 1995, and named one of the twenty-five best books by the New York Public Library. He's been writing music criticism for over twenty years and has written about music, science, politics, and the arts for the *New York Review of Books*, *Commentary*, the *American Scholar*, and the *Independent of London*, to name just a few. He has won various awards including a Guggenheim

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fellowship. Before all of that, he went to Yale, got his doctorate from the Committee on Social Thought at the University of Chicago, and did graduate work in mathematics at Brandeis. I'm thoroughly intimidated by these biographies and with that, we turn it over to Ray Kurzweil.

Ray Kurzweil: Thanks for inviting me; it's great to be here. I'd like to share with you some of my reflections on where we're going in the next century. I have been reading your book, Ed. It has some fascinating relationships between music and mathematics, which my father liked to talk about (he was a musician), and as an amateur musician myself, I have long been fascinated by the link between the order implied by mathematics and the order we find in music. Your book is quite eloquent in describing this in some detail.

I'd like to talk about the next century and the impact it will have on our civilization, and the impact technology will have, which will not stay in the technological realm, but will infuse the other spheres of our lives. In order to appreciate the next century, we need to have some understanding of where we've been, what trends we have seen, and what trends will continue. There has long been a debate about exponential growth versus what's called the "S" curve, where a particular paradigm will seem to take off exponentially and then level off. One trend that has been noted in the computer field is something called Moore's Law; how many of you have heard of Moore's Law? [Many people raised their hands.] That's quite a change from, I'd say, even three or four years ago. Even when I was talking to a technical audience, not that many people had heard of it, and now it's widely known. What Moore's Law says, literally, is that the size of a transistor, which is microscopic in size, shrinks by 50 percent every two years. We can pack twice as many transistors on a chip, and because they're smaller, the electrons don't have to go as far, so they run twice as fast. That actually quadruples the power of computation every twenty-four months. And so, one question is: how long can this go on and what impact does this have? I will come back to that but first I would like to make a few general observations about the nature of futurism and trying to anticipate the future.

A lot of people who comment on the future, including well-known futurists, fail to take into account one of three different phenomena that I think are important to account for. They are afraid to look at more than one or two iterations of progress in a particular field. When you ask people to comment on the next twenty-five years, they'll say, "Well, screens will be a little higher resolution, and computers will be a little smaller." They see one or two iterations of progress, as if in the future

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everything will come to a halt. Another failure is to not anticipate the interaction between different fields: how, for example, neurobiology will affect the evolution of computer software. If you just look in one narrow area you can anticipate certain trends, but you see much more powerful things happening if you consider the interaction between different fields. And the most common, and I think, most grievous failure, is to not anticipate the accelerating nature of change and the accelerating pace of technology.

That's something I want to talk about in a bit more depth. The pace of technology and the pace of technological progress and its impact on civilization are accelerating. Something that may have taken forty years in the past isn't going to take that long now. In the future, a comparable paradigm shift isn't going to take forty years—it may only take six years. The pace of change is greatly accelerating, which is a key insight into understanding the twenty-first century. The twenty-first century will not be like the twentieth century; we'll make as much progress in the next twenty years as we did in the entire twentieth century.

Now to Moore's Law. Moore's Law has been used synonymously with the exponential growth of computing: the price/performance of computing is growing exponentially. You only have to open the morning paper to see how the computers you can buy today have made the ones that you could have bought a month ago obsolete. That pace seems to get faster and faster. How much longer can this go on? In order to answer that, we need to understand Moore's Law. I don't mean the definition I just gave, but what is it an example of, and why is this happening? It is part of a broader phenomenon and there's very little information. In fact, I can't really find anything written about the genesis of Moore's Law other than the sort of strict, narrow, technical aspects of it.

I was at a computer conference called "Agenda 2000" two weeks ago. There, the chairman of Intel predicted Moore's Law will continue for ten to twenty years. The general thinking is that we can shrink the size of transistors for at least ten but no more than twenty years because, at that point, the key features will only be a few atoms in width, and that paradigm will break down.

So what happens then? Is that the end of the exponential growth of computing? That's a key issue because one would come up with very different visions of the twenty-first century, depending on how one answers the question. So, in order to gain some insight, one of the first things I did was take forty-nine famous computers and calculating devices (machines that manipulate information using electrical means), going back to 1900, and put them on a chart. I had the computing device that

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was used in the 1890 census (the first time the American census was processed with electrical data processing equipment) and the computer that Turing came up with that broke the German Enigma code.

A Polish spy, I think his name was Lewinsky, had stolen this Enigma coding machine that had three coding wheels—and they could see how the machine coded information. He was an unheralded hero of World War II. All they needed to do then to decode the messages was to figure out every combination of the coding wheel, so they could simply use a computer to look at every single combination and apply that to the messages and get a decoding. The only problem was that the computer had not been invented yet. (Actually, Charles Babbage invented a computer in the nineteenth century, but never got it to work.) There had never been a fully functioning computer; there had only been calculators. So Turing and his team invented the first special purpose computer with telephone relays which provided an uninterrupted decoding of the Nazi messages. Churchill got every key message from the Germans from his intelligence office, decoded by Turing's machines, and refused to use most of it. He refused to warn the English cities that they were going to be bombed because he was concerned, correctly, that the Germans, if they saw this preparation, would realize that their code had been cracked. But in the Battle of Britain, he did use this information, so that the English planes knew exactly where the German planes would be, and were able to prevail even though they were outnumbered. Otherwise history might have been a little different.

The computer that CBS used to predict the election of Eisenhower in 1952 is on the chart, as is the computer you bought for your daughter last December. I put the forty-nine computers on an exponential graph, in which a straight line would mean exponential growth. Every line you go up on the chart means multiplying computations by a factor of one hundred. So a straight line on an exponential graph means exponential growth. And one of the first things I noticed is that the exponential growth of computing goes back one hundred years, but Moore's Law didn't kick in until 1960—semiconductors were invented in 1957—so the paradigm of shrinking transistors on an integrated circuit didn't really come in to play until the 1960s. Moore's Law is not the first, but actually the fifth paradigm to provide exponential growth of computing. We had electromechanical calculators with relay-based computers, like Turing's; we had vacuum tube-based computers, which included the CBS machine; we had transistor-based computers which we used in the first space launches, and then we had integrated circuits. And each new paradigm came along just at the time when the other paradigm was running out

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of steam. For a while they were shrinking the size of vacuum tubes. They had these very tiny little vacuum tubes and they couldn't shrink them anymore. At that point, transistors came along, and a transistor is not a tiny tube, it's a completely different paradigm.

So, one of the things we notice is that any particular paradigm follows what's called an "S" curve, meaning it grows exponentially but then levels off, runs out of steam. Every paradigm does this, whether it's the biological paradigm of DNA or a technological paradigm, and what keeps the process of evolution growing at an exponential rate is a paradigm shift; innovation or invention provides a new paradigm to take over where an old paradigm is breaking down. So, we observe that Moore's Law is itself just one paradigm among many—the fifth paradigm. In my book, I talk about half a dozen, but there are in fact at least twenty paradigms waiting to take over from Moore's Law when it breaks down; unfortunately you can't necessarily anticipate which one will prevail.

Every time there's a technological need, there are generally many different paradigms waiting to take over. It's not always easy to predict which one will prevail, but invariably there's one that does have the best fit to the problem of continuing the accelerating growth. The most obvious threat to Moore's Law is the third dimension. Chips, even though they're remarkably compact and efficient, are flat. They have one layer of circuitry while our brain, in contrast, is organized in three dimensions. We live in a three-dimensional world; why not use the third dimension? My favorite is nanotubes, which are hexagonal arrangements of carbon atoms that you can build in three dimensions, and that can compute at the atomic or molecular level. We already know how to build every kind of electrical device, transistor equivalents, and so on, in those hexagonal rays of carbon atoms, and these are working in laboratories.

In fact, there have been several other molecular, three-dimensional computing technologies in the news in recent months; they're already building three-dimensional chips, so clearly we're going to go into the third dimension, just like the brain. The brain is, in fact, not that efficient. It's a remarkable entity that has evolved through natural selection; it's amazing that something this complex, and that can process information as cleverly as the brain, would evolve. But neurons are very cumbersome devices and process information very slowly. I'll come back to an analysis of the brain and what it would take to replicate it. But there will be a sixth paradigm that takes over from the fifth paradigm of Moore's Law and this, in turn, is part of a broader process which is the exponential growth of any technological process.

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You can look at a whole number of disparate processes: the speed with which you can sequence DNA, for example. When the human genome project was announced twelve years ago, a fifteen-year schedule was set and people scoffed at that, saying, "That's absurd, because with the rate at which we can sequence DNA, it'll take us ten thousand years to finish the project." But it was anticipated, correctly in hindsight, that the process would accelerate. Graphing this process shows the same kind of accelerated growth. Another example is brain scanning, which used to be very low resolution but has grown exponentially.

There are many different technical processes that grow at this exponential rate. Just look at the history of technology. It took us tens of thousands of years to figure out that if we sharpen both sides of a stone, it would create a sharp edge and a useful tool. The early paradigm shifts in technology took tens of thousands of years: sharp edges, fire, the wheel, and so on. But human beings remembered those paradigms and passed them down from generation to generation. We have a species-wide dialogue going on, and we use the tools from one generation of technology to create the next set, so the process accelerates. A thousand years ago, paradigm shifts only took a few hundred years, a dramatic increase in the pace of technological progress. In the nineteenth century, we had more technical progress and more paradigm shifts than in the ten centuries prior to it. We made more progress in the first twenty years of the twentieth century than we did in the entire nineteenth century. And today, paradigm shifts take only a few years' time. The World Wide Web didn't exist at all in anything like its present form just a few years ago.

Technical progress, the speed with which paradigm shifts take place, is accelerating; and its paradigm shifts—innovation, invention—basically clip off the tops of the "S" curves and provide ongoing exponential growth. If you look at the whole history of technology, it's very clear that the process is accelerating. And in my view (I articulate this in my book) the evolutionary process of technology development is a continuation of the evolutionary process that gave rise to the technology-creating species in the first place. The first paradigm shifts in evolution of life forms took place billions of years ago when energy organized itself to create self-replicating molecules such as DNA, a brilliant innovation that was the result of this natural selection process. That little mechanism allowed the process to accelerate so that by the Cambrian explosion, paradigm shifts only took a few tens of millions of years. The humanoids evolved from the advanced primates in only millions of years, and *Homo sapiens* evolved from the humanoids in only hundreds of thousands of years. At that point, the cutting edge of evolution became too fast for DNA-guided

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protein synthesis, so the cutting edge of evolution on this planet moved to the evolution of technology. The older forms of evolution, biological evolution, are still going on, but they're much too slow. Certainly, the evolution of *Homo sapiens* is at a virtual standstill compared to the evolution of technology, which is at least a million times faster.

So the point is that evolutionary processes accelerate over time, and you can express the exponential growth of computing in those terms. It took ninety years to create the first MIP per thousand dollars (MIP being a million instructions per second, a certain measurement of computing speed). Now we add a MIP per one thousand dollars a day, so the process is greatly accelerated. I talk about this at great length in the book. I think it is an important foundation for looking at the future. I've developed a mathematical theory that allows us to make at least some educated predictions about where we will be going, to be able to anticipate the kinds of technologies we'll have in the areas of computational speed, brain scanning, and other technological processes at different points in the future.

Miniaturization is another accelerating process. We are shrinking technology; I'm sure that everyone has seen this in his or her lifetime. Right now we're shrinking technology at a rate of 5.6 per linear dimension per decade and that's been very consistent over many decades. I also noticed that where I put the computers on an exponential graph and expected to get a straight line for exponential growth, I actually got another exponential. The rate of exponential growth is itself growing exponentially. We doubled computing power every three years at the beginning of the century, every two years in the middle of the century, and now, at the end of the century, we're doubling computer power every year.

I've used this model for about twenty years now. A book I wrote in 1980, *The Age of Intelligent Machines*, basically looked at, for example, how many moves ahead you have to look to be the grand master or the world champion in chess. I'm not presenting chess as an exemplar of the breadth and depth of human intelligence, but it's one intelligent activity. Nonetheless, we can anticipate what's required to play at different levels, and looking at the speed of special purpose computers, I calculated that in 1998 a computer would take the world chess championship. This was overly conservative by one year because that event took place in 1997. I also anticipated networks like the World Wide Web emerging in the late 1990s. This model does provide a foundation for making predictions. It doesn't give us an absolute crystal ball, but at least we can have an idea of what's feasible at different points in time.

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And if we use this model and extend these graphs into the twenty-first century, what we see is the following.

Currently, a one-thousand-dollar computer provides an amount of computation that's somewhere between that of an insect and a mouse brain. Now, insect and mouse brains are very well designed for meeting the challenges of being an insect or a mouse. Computers are designed for other purposes, but that's where we are today. They're still at least a million times simpler than the human brain, which is at least one reason why computers today don't have all of the endearing qualities we associate with human intelligence. This is in terms of just processing power, which is only one part of the equation because we're more than just raw capacity, although it is at least one necessary ingredient. The human brain has about a hundred billion neurons, and each neuron has an average of a thousand connections, so the brain has about a hundred trillion connections. The calculations basically take place in the connections. They're analogue, not digital, but we can emulate analogue calculations, either by using digital circuitry or just by building analogue circuits electronically. But that's a technical detail.

There are a hundred trillion things going on in our brain at the same time. But neurons are very slow. Neurons are very complex entities, although most of that complexity is devoted to life processes, not their information-handling abilities. Their information processing is not as complex as the overall complexity of the neurons, but is much more complex than, say, the simplified mathematical models that we use in the field of neural nets. But there is an emerging field that is sort of a cross-section between neural nets and neurobiology, where we're attempting to build very detailed, realistic models of neurons. I'll come back to that.

At any rate, neurons calculate only about two hundred calculations per second, which is at least ten million times slower than electronic circuits. But two hundred calculations per second multiplied by one hundred trillionfold parallelism is twenty million billion calculations per second, or about twenty million MIPs. We will achieve twenty million MIPs for one thousand dollars in about 2020. By 2030, a one-thousand-dollar computation will be one thousand times more powerful than the human brain; by 2050 a one-thousand-dollar computation will equal ten billion human brains. I might be off by a couple of years, but the twenty-first century won't be wanting for basic computational capacity. However, this is just one necessary—but not sufficient—ingredient to recreate human intelligence. If all we had was an extremely fast computer that could do twenty billion MIPs, or more, we could compute your

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spreadsheet in a billionth of a second, but that doesn't give you the subtlety, the richness, the depth, and the complexity of human intelligence.

How are we going to achieve the software of intelligence? I think the most compelling way is to use an entity that exhibits those qualities—the human brain. We have a few dozen in this room, and it's not hidden from us: the organization of the human brain, how it processes information, its knowledge, and its learning are available if we care to take a look at it.

We're well down the path of reverse-engineering the human brain by examining it in detail and understanding its methods. We've already been able to examine some of the regions of the brain, which is not a *tabula rasa*. It's several hundred different specialized regions that are organized differently; each has a different way of processing information. We actually have an understanding of several of them. The speech recognition software we've developed, for example, performs the same transformation of auditory information that the early auditory cortex does, and that allows the software to understand human speech with much greater accuracy. We're beginning to understand the methods in those regions where we have some access. So, if we could understand the human brain and have a complete understanding of how it works, we would be able to use those insights to build intelligent machines.

How are we going to get access to that information? Well, we already have brain scanning that can look non-invasively at the human brain; and the speed, resolution, and bandwidth of brain scanning is accelerating along with the other technical processes. One scenario I find particularly compelling is to scan the brain from inside. We already have scanning technology where if you put the scanning tip—the tiny pin-sized scanning tip—in physical proximity to the neural features, you can scan the brain with extremely high resolution and see the interneural connections, even the neurotransmitter concentrations, where our learning resides. If you ask "Where's my knowledge of any particular field?" or, "Where are my memories in learning?" it's a vast, extremely complex, distributed pattern in particular regions of the brain made up of interneural connections and neurotransmitter concentrations, synaptic clefts, and other neural components. We can see those, and we actually have technology we can touch and feel today to scan those neural features with extremely high resolution—if the scanning tip is in physical proximity to the neural features being scanned.

So, in order to scan the entire human brain, we simply take the scanning tip and move it to every single position in the brain and take a high-resolution picture of it. How are we going to do that without making a

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mess of things? The answer is to send the scanners to scan the brain from inside by way of the capillaries. Now, this is a scenario we can touch and feel because we could actually build these devices today, except we can't make them small enough: they need to be the size of blood cells or smaller. We actually have the technology to build them pretty small today. For example, there are devices called "smart dust." About one millimeter in size, these tiny devices have computers in them and can fly, communicate, take pictures and other measurements, and can be dropped in an enemy terrain from an airplane. So we're already building extremely tiny devices, but we still can't build the blood cell size that I am describing, yet. And if we could, it would be very expensive. But these are exactly the kinds of capabilities we can reliably anticipate in terms of the law of accelerating returns.

As I mentioned, we're shrinking technology at a rate of 5.6 linear dimensions per decade and we're exponentially raising the price performance of computing. Conservatively put, this scenario will be feasible within thirty years. At that time, we will be able to send billions of little nanobots, or nanorobots the size of blood cells, inside the human brain. They would be programmed to take amongst them cumulatively every single path through all the capillaries, travel in physical proximity to every single neural feature, and scan and build up a massive database of every single thing, every salient neural feature in the brain. They'd all be on a wireless local area network, so they'd be communicating with each other, sharing their information, communicating with computers on the outside that are compiling the database, and we'd be able to get a dump—a database, a download—of every single salient feature in the brain, including all the neurotransmitter concentrations and the results of all our experiences and so on.

Now, what are we going to do with that information? Well, for one thing, we'll learn a lot about how the human brain works. Having this massive database doesn't immediately mean we understand how the brain works; we'd have to begin to understand those processes. But that's not impossible because we have, in fact very accurately, decoded many different types of neurons. Carver Mead at Cal Tech has built very compelling replications of different neural systems, including the early visual system, the early auditory cortex. His vision chip is now being built into advanced digital cameras. Recently, at the Institute for Non-Linear Science in San Diego, scientists actually took a biological set of neurons from an animal, a lobster, and built a detailed mathematical model from it—a much more complex model than the simplified one used in contemporary neural networks. They then built electronic replications of

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those neurons and replaced some of the neurons in the biological network with the artificial ones.

Now, when you look at the biological network, you will notice that each neuron operates chaotically—it apparently fires randomly and wildly. All the neurons are doing that and, over a fraction of a second, some sort of equilibrium occurs in this massively chaotic system. Generally, a pattern emerges in such a chaotic biological system, which is the decision of that biological network. So if that biological network is doing, let's say, a pattern-recognition task, which is typically what neural networks do, that emerging pattern is the pattern-recognition decision of the network. At the Institute for Non-Linear Science, scientists examined how that network of biological neurons from this particular animal responded to different types of inputs such as environmental conditions and other sets of stimuli. And then they replaced some of these biological neurons with their electronic equivalent to see if the biological neurons would accept the non-biological ones, and how that would work. The experiments appeared to work: the biological neurons accepted their non-biological peers, the whole network operated, as far as they could tell, the same way that the old biological network did, and it was in fact able to perform the same kinds of tasks that the fully biological network performed.

These experiments, in my view, are not definitive, and don't prove that their model is a perfectly accurate model of the neurons that they've replicated, but they certainly suggest that their models are pretty close. And once we have a massive database of the brain, we can begin to understand how different regions work. We currently have the genome project, from which we have a database of the human genome, which will be finished within a couple of years. That doesn't mean that we understand fully how it works, but the process of reverse-engineering the brain and understanding it is well under way. We do understand certain regions of it, and that's very powerful information.

In another scenario, we could simply take this massive database and, without necessarily understanding the full process, copy it, and recreate those processes in a neural computer of sufficient capacity. That requires us to understand the local processes, but not necessarily the full global process. So, if you scan my brain, and then recreate it in a neural computer in the year 2035, you'll get an entity that would, once the technology was refined and shaken down, act as if he were Ray Kurzweil. This entity would have a copy of all these vast patterns of interneural connections and neurotransmitter concentrations that represent my skills and my memories and my personality. So, he would claim,

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"Yeah, I'm Ray Kurzweil, I grew up in Queens, New York, I went over to my Aunt Edith's house and played with Ronald and Vivien, went to Boston, went to MIT, sold a few artificial intelligence companies, I was on this *Partisan Review* panel, a few decades later I walked into this scanner over here, woke up in a machine; hey, this technology really works!" You would, of course, have to give him a body, because he would quickly get depressed without one. However, that's another complicated discussion and we have little time. But I would like to mention that replicating our bodies is an easier task than replicating our brains. We will have twenty-first century bodies for our non-biological intelligent entities—virtual bodies and virtual reality bodies created through nano-technology, which is building physical entities atom by atom. But this entity will at least act as if he were Ray Kurzweil.

This introduces obvious philosophical issues that we can talk about. One is: Is this a continuation of Ray Kurzweil's consciousness? There's a fairly obvious argument against that, which is the continued existence of the old biological Ray Kurzweil. If you come to me in the morning and say, "Good news, Ray, we've succeeded in scanning and reinstantiating your body and brain; we don't need the old carbon cell-based Ray Kurzweil anymore," I might see a flaw in that philosophical perspective. I might wish the new Ray Kurzweil well, but would probably end up jealous of him because he would be in a better position than I am to fulfill my own wishes and dreams. But I would see him as a different person than myself, and obviously his experience from that point begins to diverge from mine. So at least he would have a different consciousness.

Another question is: Is he conscious at all? Some people say, "Well, okay, he's a very convincing replication, and as the technology gets better, he'll be a more accurate recreation of the original Ray Kurzweil, but it's just a machine, and it's not conscious." This is a difficult issue; we've debated the nature of consciousness for thousands of years, back to the Platonic dialogues. In the twenty-first century we will meet entities that are sufficiently compelling and convincing; the issue of consciousness, the nature of subjective experience, will become a very practical issue. We will meet entities that claim to be conscious. Even today you can meet non-biological entities that claim to be conscious, such as your children's video games, but they are not very convincing and they are not compelling. You quickly run up against the limits of their intelligence and personalities; you can see the boundaries of their capabilities, so it's not a fully convincing illusion, if you will.

In the twenty-first century, however, as we get to the 2030s and the 2040s, these entities will be very convincing and very compelling; you

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won't find the boundaries of their capability any more quickly than we find them in other humans. So when they claim to be human, when they claim to be conscious, they will be very convincing. In fact, they'll be very intelligent, so they'll succeed in convincing at least many of us that they are human and that they are conscious. But some philosophers will say, "No, you can't be conscious unless you squirt neurotransmitters or unless you are based on DNA-guided protein synthesis." We have a similar debate today with animals. People say, "Well, okay, the behavior of certain advanced animals seems like human behavior in certain ways, but they don't have advanced language capabilities like humans, so they're not conscious, they are just these sort of automatic machines."

In my view, fundamentally there's no absolute scientific objective test for consciousness. We can test for correlates of consciousness, behavioral correlates, but such a test would be based on a fundamental assumption that these human entities are conscious. We all assume that other humans who at least appear to be conscious are conscious. I assume that all of you are conscious; if I keep speaking much longer, maybe you won't be, but outside of our shared human experience, if we look at the potential consciousness of animals, shared human consensus breaks down. This will become even more controversial when we have non-biological entities that claim to be conscious. However, these non-biological entities will appear to be human to a greater extent than animals appear to be human because animals really are distinctly different in their capabilities. If we have perfectly replicated a human brain—and this is a technical task that is not impossible—it's quite feasible that machines will appear to be human. We can touch and feel all the techniques needed to do that today; we can't quite do it yet however—we don't have the miniaturization; we don't have the computational power—but if you look at the current trends, we will be there within a few decades. These will become feasible scenarios.

I want to finish with one more scenario, and I'm sure other issues will come up later. How will all this affect human civilization? I don't view it as an invasion of intelligent entities coming over the horizon. In my opinion, we're going to enhance our own intelligence and our own experience by becoming very intimate with our technology. We're very intimate with computer technology today; it's very much integrated into our human civilization, into our human decision-making. A significant fraction of financial decisions, for example, are made by computer systems, by neural nets and evolutionary algorithms, which are simulations of evolution in the computer; the results are chaotic and unpredictable. Computers are making decisions in our financial markets and pattern-recognition

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systems, and are making medical diagnoses. I could go on with many examples. If all the computers in the world stopped functioning today, civilization would grind to a halt. You might say, "Well, of course that's true." But that wasn't true as recently as thirty years ago, so in the last thirty years we've made that fateful leap to becoming very dependent on our computer technology, and it's already very interwoven with human decision-making.

As we go through the next several decades, we're going to become increasingly intimate with our machines. For instance, in 2009, we won't be carrying around these notebooks, or even these palmtops; computers will be invisible. I recently had occasion to use the new displays that are literally built into eyeglasses; you can use prescription lenses that could be built into your contacts and will display a virtual screen in front of you that you could zoom in and out of. You can also see through it, so you can experience the real world too. Interconnection to the Web will be continual and wireless and very high bandwidth. By 2009, the electronics will shrink, so that you won't see them; they'll be in your glasses, they'll be in your clothing. Everyone will be walking around connected to the Web at all times. This is a very non-invasive scenario because it's not in our bodies and brains, but it has disappeared into our environment and into our accessories and clothing.

As we go through the second decade, the resolution of those screens won't just be like computer screens, they will be able to encompass our full visual reality. Going to a Web site will mean entering a virtual reality environment. Basically, we will be able either to replace or supplement our visual experience; it'll be like those arcade games in virtual reality, except that they'll be as realistic and compelling as *real* reality. For a meeting like this, rather than having to congregate physically, we could enter a virtual reality environment, and as you looked around, it would be just like being there. We could have met in this actually quite lovely room, or we could have met in a Mozambique game preserve, or on a beach in Cancun, or whatever location might be appropriate for the meeting.

Along with full visual and auditory virtual reality, there will also be ways of simulating tactile virtual reality. That'll be a little more cumbersome, but by 2019, we'll have fully all-encompassing visual, auditory, and tactile virtual reality so that you can have any kind of experience with anyone, from business meetings to sensual encounters. That will be the nature of the World Wide Web. Some virtual environments will be recreations of real world environments, some will be environments that have no counterpart in the real world. Some perhaps will be impossible in the real world because they violate the laws of physics, but that'll be

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the nature of the World Wide Web. As we approach 2030, virtual reality will take place from inside, coming back to the nanobots. Again, this is technology that we can touch and feel today.

We already have something called a neuron transistor, which is an electrical device that can communicate in both directions with a neuron without physically touching it. It doesn't have to have a wire stuck into it; just by being in physical proximity to the neuron, it can detect the neuron firing, it can cause the neuron to fire, and it can suppress the neuron from firing—this is two-way communication between the neuron and the electrical device. So, we send billions of neuron transistors into the brain and they take up positions next to every nerve fiber coming from all of the senses. If we want to be in real reality, these nanobots sit there and do nothing and we operate normally. If we want to enter virtual reality, the nanobots close down the flow of signals coming from the real senses and replace them with the signals that would be appropriate for the virtual environment. And, when in virtual reality, when you move your arm or your hand, or walk, the nanobots would suppress those signals from moving your real body, but would basically compute to move your virtual body and you'd hear and see and feel the appropriate things in the virtual environment.

These nanobots will be on a local area network, so you will be plugged into the World Wide Web and will be able to go to a virtual environment by yourself, or you can go and meet other real people and have any kind of experience with anyone in these virtual environments. The nanobots will also enhance our brains because they will communicate wirelessly. They will be able to create new connections, break connections, and create whole new networks. As we understand how the brain works, we can multiply human memory a millionfold; we can vastly expand human capability and cognitive functions.

One thing about the future that I think is important to understand is that once non-biological entities can match human intelligence, they'll necessarily soar past it, for a few reasons. For one thing, machines can share their knowledge. If I spend years learning French, I can't just download that knowledge to you—you've got to spend years learning it the same painstaking way. But at least we can communicate slowly, something that other animals don't seem to do across generations. We have this species-wide, cross-generational dialogue and knowledge base that's being built up, and that's a unique aspect of the human species. But we can't instantly download knowledge. Now where is that knowledge of French in my brain? Well, actually, there isn't much. But if you take a subject I know something about, it's a pattern of interneural connections

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and neurotransmitter concentrations, a vast complex pattern of information in my brain.

As we build computer emulations of these processes, we're not going to leave out the quick downloading ports. We have a good example of the advantage of downloading information in our speech recognition software: we spent years training one computer to understand human speech. It made mistakes and we corrected it and then we presented it with ten thousand hours of recorded speech for it to recognize. The results were all transcribed so if it made a mistake it was automatically corrected and adjusted its patterns. Over years, it finally learned to do a pretty good job of understanding human speech. Now, if you want your notebook computer to recognize human speech, you don't have to go through that painstaking process; you can just load the program, which is the resulting pattern that we evolved over years of training one machine.

Machines can instantly share their knowledge, which is something that the human brain can't do. Also, machines are inherently much faster. If we build, let's say, a copy of the human brain using non-biological computing mediums, it could be potentially ten million times faster or more. We can make it much larger and expand it well beyond human memory. We are hard-pressed to remember a handful of phone numbers—in fact, I forgot the address of this location on the way over here. Machines already have much more accurate and prodigious memories. Computers don't yet have the subtlety, richness, and depth of human intelligence because they're still a million times simpler, but that won't continue to be the case. When they do achieve that, combining it with the natural advantages of machine intelligence, knowledge-sharing, and the speed and accuracy of memory, it will be a very formidable combination. But it's not an invasion of intelligent machines coming over the horizon—it's an emergence from within our human machine civilization, and the primary application of these machines is going to be expansion of human capability.

We're already doing that with the somewhat intimate way we use computers today. As they become invisible and disappear into our clothing and eyeglasses, it'll be another step in the intimacy of the connection, and a further step as they then go into our brains, something I call the non-invasive, surgery-free, reversible, programmable, distributed neural implant. Then computers will really expand our experiences and our cognitive functions. By 2035 or 2040, human beings will be a combination of biological and non-biological intelligence. But it will all have emerged from the human machine civilization. So I think I'll leave it at that, and I'm sure we'll cover more ground as we go through the morning.

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Jacob Weisberg: I want to thank Ray Kurzweil for that stimulating, in fact I would say mind-boggling, talk. That was, as we say at Microsoft, "cool." And with that, I'm going to turn things over to Edward Rothstein, who will give the first response. Afterwards, we will open it up for questions.

Edward Rothstein: Before responding to specific ideas Ray has outlined, I want to survey the cultural history of which Ray's predictions are a part. In reading Ray's book I was reminded of a story I read as a child. I think it was by Isaac Asimov. It was about a computer, maybe in the fortieth century, that had developed an extraordinarily sophisticated intelligence. Over the centuries it continued to evolve, teaching itself about the universe, until it became a sort of world intelligence. So much knowledge was absorbed by the machine, and so much was understood by the machine, that it could hardly be thought of as a machine.

After tens of millions of years, it became clear that one of the pressing issues facing the human species (or the species that humanity had evolved into) was what to do about the Second Law of Thermodynamics. That law declares that entropy in the universe is increasing and that order is decreasing; it confidently asserts that ultimately everything will dissolve into chaos. And in this story, that ultimate moment is fast approaching. Sensing the crisis, the computer devotes 90 percent of its energy to trying to address this issue, until, finally, it seems as if the worst is about to take place. Humanity has disappeared. The universe is on the brink of total chaos.

At that point, having absorbed millions and millions of years of information until it understood everything about the cosmos, the computer finds a solution. It looks around at the darkness and chaos and it says: "Let there be light."

Now Ray's predictions about the evolution of the machine stop a little bit short of this idea, but I would be surprised if he found this an implausible scenario a few million years hence. In foreseeing the next century, of course, he is far more modest. But the changes he predicts are still quite radical and affect our ideas about what we consider to be human. I want to put aside for now the question about how realistic or probable or possible these predictions are, and instead consider the long tradition of technological prediction in which Ray participates.

Ray points out in his book that almost all prophesies about technology have been wrong in the past. While Jules Verne was right about moon travel—he even imagined the automobile, the electric light, and the fax machine—otherwise almost nothing has been predicted accurately. Even inventors have gotten their inventions wrong: Edison

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thought that the phonograph would primarily be used for dictation and business applications. The airplane was hailed as a force that would bring world peace because it would bring people closer together; instead it found its first major application in war. The telegraph was going to create new forms of kinship in the United States; instead it made dispersion more practical. I recall a few years ago hearing Leo Marx, a historian who has written about technology and culture, talking about how in the late 1970s he was on a panel at MIT with computer scientists and various other technologically oriented thinkers. The challenge was to imagine applications for future miniaturizations of the mainframe computer. Would there ever be a use, the panel wondered, for a small desktop computer? Marx recalled that at this discussion, the various discussants were unanimous on one point: there would be almost no real application for a desktop computer. Maybe, they guessed, a few dozen such machines would find specialized uses, mostly for shut-ins or people who wouldn't have access to mainframes. Well, of course, within five years of that discussion, this prediction was proven dismally and ludicrously wrong. Even more recently, the Internet has taken nearly everybody by surprise. Various prophecies about its powers to transform human nature were made, but there were, in the early years of the World Wide Web, no predictions I recall about how central commerce would be to the success of the Internet.

Why then do we keep making such predictions? Partly because the impulse to predict—putting aside for a moment the question of whether or not predictions are right or wrong—the impulse to see where these inventions will lead, can have, at times, a religious dimension. Even though we tend to think of technology and engineering as activities that are rational and a-religious or even anti-religious, there have actually been close connections between the development of technology and religious thinking. In the Middle Ages monasteries were centers of invention as well as worship. The mechanical arts were practiced not to displace religion but to aid in achieving its Edenic goals. Giordano Bruno, who worked at the edge of modern science, considered machines to be a spur to spiritual evolution. Newton wrote commentary on Scripture. The English scientist Robert Boyle wrote a treatise entitled "Some Physico-Theological Considerations About the Possibility of the Resurrection." Charles Babbage—widely known as the father of the modern computer—believed that advances in the "mechanical arts" provided "some of the strongest arguments in favor of religion." And more: the first telegraph message was a Biblical quote—"What hath God wrought"—while its inventor, Samuel F. B. Morse, was a generous donor to religious

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organizations and the son of the founder of the American Bible Society. Orville and Wilbur Wright's father was a bishop of the Church of the United Brethren of Christ. David F. Noble pointed out in a recent book that Freemasonry, with its combination of religious ritual and devotion to craft, also became influential in spreading the technological faith. He points out: "masons have been among the most prominent pioneers of every American transportation revolution"—in the development of canals, steamboats, railroads, the automobile, the airplane, and space flight.

This religious belief is also connected with the notion Ray has outlined, the idea that technology has brought us to "a pivotal event in the history of the planet." Technology has become (and not just for Ray, but for all of us) an extension of evolution. This is, in fact, what technology really implies. It's literally the mastery and making of things, but its power comes from the effects it has on the world around them. The word "technology" didn't come into great use until the last one hundred years or so, and its main application is not just a description of the "mechanic arts"; instead, the word links such arts to a notion of progress and social transformation. The railroad's conquest of the American continent, for example, depended on specialized technical knowledge, a trained workforce (along with cheap manual labor), centrally regulated time zones, and a modern system of industrial management. The locomotive helped create new networks of ideas, people, and procedures that spread along with the laying of track. This idea of social transformation is one of the key themes in Ray's vision of spiritual machines. It is what we mean by "technology."

Putting aside again the question of plausibility, it is no wonder that we are drawn to such expectant visions. Some of them may really turn out to be true (very few), but they are also tremendously reassuring. In almost every other aspect of society and culture, we no longer believe in anything like progress. For centuries there were beliefs that historical laws, social laws, or spiritual laws would lead to more enlightened societies, more enlightened human beings. No longer. In the humanities, it is often argued that we are no wiser than our predecessors and are just replacing one era's illusions with another's. In culture, artists are no longer thought of as building on the achievements of the past. And despite the persistence of strains of political utopianism, few now believe we can set out on a path of progress if only we could figure out the right policies. But with technological change, things are different. We can sense a direction, an unfolding. Successful inventions are improvements. They create new possibilities. Technology's effects may

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not be predictable, but it still seems to be rushing forward with all the utopian energies we once found in other human activities.

Ray's vision of the future is also connected with a particular notion of technological progress. Over the last twenty years, there has been an increasing tendency to shift the metaphors for how we think about the world from mechanical metaphors to organic metaphors. For example, the earth, once imagined as a "system"—an ecosystem, a chemical system, a weather system, a population system—is now often spoken of as an organism; this is the nature of the "Gaia" hypothesis that speaks of the entire planet as if it were a living being (and this is not just meant as a metaphor). Even the Internet, which is little more than a connected network of computers all sharing certain instructions for how to send and interpret messages, has been compared to a living organism or at least a primal cybersoup out of which new organisms will evolve. Society, which was once thought of as a machine in which gears properly meshed, and, in which an adjustment in one area would require some tinkering in another, is now a "hive" in which we are all unknowing parts of some larger organic whole. Some ideas in economics have been recast in this way too. One advocate of this new way of thinking (a theory that has been called "bionomics" by its advocates) recently wrote: "A parallel relationship exists between an ecosystem based on genetic information and an economy derived from technical information." When we study ecological relationships between different species, we will, in this argument, also learn something about how economics works.

And finally, in discussions of life and the essence of life—areas central to Ray's argument—there is actually a field called "A-Life," or artificial life, which bears the same relationship to real life as artificial intelligence does to real intelligence. The aspiration is similar and so are some of the arguments. The argument of A-Life is something like this: that if we can take a look at how organisms propagate, evolve, and change, and can model these complex changes properly with computers, the results will begin to resemble life itself in every relevant fashion. Such computer models begin to act in apparently novel fashions, almost seeming to become independent organisms. They display "emergent qualities," aspects that are not necessarily planned for or programmed, but that emerge out of the complex set of relationships being established. Some people think of the brain this way—as a machine that is so complex it becomes alive, its emergent qualities far beyond the reach of any of its parts. There are some radical investigators into A-Life (which even has its own journal published by MIT Press) who argue that there may ultimately be no differences between sufficiently complex models of A-Life and life itself. One of

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the researchers in A-Life has said, "We would like to build models that are so lifelike that they cease to become models of life and become examples of life themselves."

And finally, one other example of how these metaphors of our understanding of things are shifting, one of the more suggestive ideas about how ideas actually work in recent years, has been the idea of a "meme." The concept was first proposed by the evolutionary biologist Richard Dawkins in his 1976 book *The Selfish Gene*. What makes humans unique, Dawkins proposed, is that we are the only animals with culture. But culture, he argued, is as Darwinian as other aspects of biological success. Ideas, styles, and beliefs are passed on from person to person, from generation to generation. Sometimes these ideas compete and are transformed; sometimes they die out; sometimes they sweep a community with feverish intensity. Such ideas can be tunes, phrases, ideologies, styles. And Dawkins calls them "memes" (which rhymes with "schemes") to create a parallel with the idea of "gene." In Dawkins's view, just as genes cause human actions that would serve the propagation of the gene, memes act in human culture in such a way as to replicate themselves. They can infect their human hosts, leap from brain to brain, cause mass suicides and organize mass political movements. There is now a field known as "memetics" that studies the idea of the meme. Basically the idea is to study ideas and their propagation, not by examining their content, not by determining whether something is right or wrong or whether it's justified or unjustified, but simply by asking whether or not an idea has survival value, whether it can successfully replicate itself in its human hosts.

In all of these varied respects, as organic metaphors replace mechanical ones, it might seem that mechanics become less important and life itself becomes more important. But there is also a cautionary note to be sounded. Often the reverse happens. Ethics and politics become irrelevant. Life actually ends up seeming more machine-like. Is A-Life a version of life or is life a version of A-Life? Are we really forms of "wetware" (as organic life forms are sometimes called), coded with our own forms of software? So there are dangers, even in Ray's vision of spiritual machines, of life becoming more diminished in importance as its boundaries become less and less clear. Yet these ideas are also connected with the greatest advances in technology that have ever been known. Where this will lead—whether to spiritual machines or mechanized spirits—we will, in time, find out.

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Jacob Weisberg: Thanks, Ed. I'm going to exercise the moderator's prerogative and ask the first question. Let's start by taking up this idea of predicting the future. I think it's been said that there are few things more amusing than the past's idea of what the future would be like. Seventy years ago people thought that we would travel around cities in what would be giant aerodomes, in our private flying vehicles. You could go on and on with other past science-fiction scenarios that didn't exactly work out as envisioned. Since you wrote your last book less than ten years ago, something called the Internet emerged. In 1993, I didn't know what the Internet was; in 1996 I began earning my living working on the Internet. All that is a way of asking: is there any way to predict the future with any degree of certainty? I realize that in your book you hedge, and you make some qualifications to this effect, but what then is the value of trying to predict the future, especially fifty or a hundred years out, by extrapolating from current trends?

Ray Kurzweil: I actually don't make a lot of distinctions in my attempts at futurism. I am quick to acknowledge the failure of futurism, and I do that at some length in the book. I think a lot of attempts to predict the future are not well-grounded and people just pull ideas out of thin air; it's not hard to find failures in such predictions. Some individuals have been more insightful than others. I think Turing, for example, was remarkable; he wrote a paper in 1950 which really was a blueprint for artificial intelligence research up through the present, and actually talked about a lot of the things that I do. His time frames, while not entirely accurate, were not that far off. But, in my mind, attempts to predict the future have failed to consider a number of factors.

I've been interested in this issue for over twenty years and have developed a methodology that I think takes into consideration a number of important principles that most attempts to predict the future have not. It concerns an analysis of how paradigm shifts occur, the nature of a paradigm shift and the impact it has on technology, and the accelerating pace of change. If you go back and look at an evolutionary process, like the history of life forms or the history of technology, the exponential growth is undeniable. So, even though technology and its future might appear to be unpredictable, there's a remarkable regularity in certain aspects of it. For example, looking at the growth of computation on all these different computers on an exponential chart (page 24 of the book), you see an amazingly smooth curve, which obviously results from thousands of different innovators, many different technical issues, and many unpredictable paradigm shifts. But somehow it produces a

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very predictable phenomenon. I have developed a methodology—with a set of mathematics behind it. I don't have a perfect crystal ball, but my track record has been quite good by using this methodology.

If you read *The Age of Intelligent Machines*, which I wrote in the 1980s, and which came out in 1989, it predicted (I didn't call it the World Wide Web) something that sounds like the World Wide Web in terms of a worldwide network of interconnected computers and information resources that anybody could access. In fact, a lot of predictions in there are quite accurate, including sustained economic growth, because of two things: the increasing efficiencies of information technology and the value of information and knowledge itself.

Recently, Alan Greenspan attributed the unprecedented economic growth of the 1990s to the efficiencies of information technology, which is half the story; the other half is the fact that new wealth consists of information and useful information-knowledge. We've created a trillion and a half dollars of new market capitalization in Silicon Valley alone over the last ten years, all of which is knowledge primarily in software technologies that are infusing the whole economy; five or six trillion dollars of new market capitalization throughout the country are in these information technologies.

I predicted the strategic reliance in warfare on the intelligence of software and information technologies. We first saw that in the Gulf War in the 1990s, and then more recently in the show of total domination by Allied forces because of the superiority of our electronics and computer technology. I also predicted the fall of the Soviet Union because of the democratizing effects of distributed information. And the coup of 1991 against Gorbachev was really undone, not by Yeltsin standing on a tank, but by the fact that everyone was kept informed by the early forms of e-mail, fax machines, and cell phones—technology that is much more powerful than the copiers the authorities had traditionally banned. And, I said that the authorities in the Soviet Union had a dilemma: they could either provide knowledge to workers (basically all their administrators and professionals) with computer technology, which would be vastly more powerful than the copiers they had officially banned, and would in turn break their control over information—which is the foundation of totalitarian control—or they could deny them these technologies, in which case they'd become economically irrelevant. And I predicted they would do a bit of both, and to the extent that information technology did seep out, it really destroyed the ability of the authorities to maintain totalitarian control. To the extent

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that they tried to control these technologies, they set themselves back economically, which they're still struggling to overcome.

So I've made a serious study and model of technological trends on which I made predictions for twenty years. I don't think I'm embarrassed about any of them. I wouldn't predict, for example, which paradigm is going to take over from shrinking transistors on integrated circuits—there are at least twenty different new technologies in the wings—but I think that any number of them have the potential to continue that trend after Moore's Law dies. It's important to realize that even though a particular paradigm will run out of steam, the phenomena that drive an evolutionary process forward are the constant shifting of paradigms and the innovations that result in new paradigms. Dawkins called biological evolution "the blind watchmaker." Actually I think he should have called it "the mindless watchmaker" because the phrase "blind watchmaker" is a little insulting to visually impaired people. But the current evolutionary process we're in the midst of is not a mindless watchmaker, it's a mindful watchmaker, which implies that we have the ability to shape at least the application of this evolutionary process.

But we haven't talked about the downsides to all of this; I'm not an unqualified optimist in predicting that these technologies will necessarily have a positive impact. My orientation tends to be optimistic but I do talk about the downsides in the book, and the story of the twenty-first century hasn't been written. There are many dangers in these technologies—you don't have to look any further than today. Take bioengineering. We're in the early phases of a revolution that will, I believe, over the next decade or so, largely reverse most of the major diseases we struggle with, reverse aspects of aging and extend human longevity; it's a terrific thing. We're already seeing some of the benefits: the progress we've made in AIDS research is due to bioengineering. These are all presumably positive developments, but now the means exist in a routine college bioengineering lab to create a pathogen that would be much more destructive than an atomic bomb. And the knowledge, skill, and equipment to do that is much more accessible than the skill and equipment needed to build an atomic bomb. So that's a great danger. The technologies we're going to build in the twenty-first century are going to be even more powerful and they will give us the opportunity to create the kind of world we want, but there are also enormous dangers. I have taken the art of futurism quite seriously, built a model of it, and I think it needs to be examined on its own and not evaluated on the litany of failed predictions, of which there are many.

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Edward Rothstein: I think the argument Ray makes in the first part of his book is more startling than the arguments about the evolution of the computer and "spiritual machines" he makes later on. Ray's argument is that evolution and the speed of technological change are independent of particular technologies. This is extremely suggestive because, in his view, the rate of change has nothing to do with a particular material or a particular invention, but with the relationship between order and chaos. If indeed this is something that can be formalized, then it changes the way one has to think about what is happening with technology. While I'm not convinced that machines will take the path Ray has outlined, the first part of his book has convinced me that I have to re-think the nature of technological change and where it might be leading.

Where I am skeptical, though, is that even if we grant the ever-increasing speed of technological innovation, Ray, you may be underestimating the complexity of the brain itself, which may be many orders of magnitude more intricate than you think; the neurobiologist Gerald Edelman calls it the most complex object in the universe. Will it ultimately be reproduced by a machine? I cannot say. But it may not be as soon as you think.

Ray Kurzweil: There are different estimates. I use one of the more conservatively high ones but let's say I'm off; it doesn't really change things that significantly. If I'm off by a factor of a thousand, that's nine years; if I'm off by a factor of a million, that's seventeen years; if I'm off by a factor of a billion, that's twenty-six years. And I don't think I am off, because there have been a lot of experiments even since the book came out that suggest the estimates are reasonable. There have been many experiments to replicate neurons and neuroclusters, not in the form of mathematically simplified neural nets, but realistically recreated biological neurons that at least emulate their information; and the salient processes that affect their functionality, other than digestion and so on, would show that our models of their functioning are reasonably accurate. But even if I'm off, the power of exponential growth is so great that even a factor of a billion only means a quarter of a century.

Jacob Weisberg: Let's take some questions from the floor.

Audience Member: Ray, it seems that what you are saying is that you're not in the business of telling us how we're actually going to live in the future, you're simply trying to predict, with the highest degree of accuracy possible, what will be available and what we need to think about.

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Ray Kurzweil: Yes. I think the most important point I'm trying to make, as you indicate, is describing a methodology of thinking about the future, and moving towards understanding some very powerful trends and forces that are accelerating technology forward, towards understanding the nature of the power of, let's say, computational capabilities in the future. It's very difficult to paint scenarios. Very often magazine editors ask me, "Well, just write a little scenario about what Joe's doing in the morning in the year 2035." I hate trying to write something like that because then you get into details that are invariably going to be wrong. There are going to be a lot of inventions and innovations. By definition we can't anticipate these now because we haven't come up with all the ideas of the twenty-first century. But we can say that there are going to be more ideas in the twenty-first century than there were in the twentieth. I'm talking about it all in terms of basic principles.

Jacob Weisberg: In your book you quoted, I think from a 1949 issue of *Fortune* magazine: "By next year a computer will weigh as little as one and a half tons."

Ray Kurzweil: Well, very few people anticipated the nature of exponential growth. Turing had an inkling of it.

Edward Rothstein: One other question: Ray, could you just review why you think this abstract principle of exponential growth will not itself reach some limit?

Ray Kurzweil: Well, people are quick to criticize exponential trends because they run out of resources. The classical example is rabbits in Australia. A new species happens upon a new habitat and its numbers spread exponentially but then hit the limits of its environment so it has to be asked: what are the resources that any exponential trend is using? The resources of this exponential trend are twofold. First is the order of the evolutionary process itself. It's not necessarily trivial to define what the order is—in, let's say, biological evolution—but if you look at it you see increasingly intricate entities, first single-celled organisms and then more complex ones. Secondly, human beings represent an enormous amount of order that has emerged in the chaos of the world. And one level of order provides the foundation and the tools to create the next generation of that evolutionary process.

The other resource needed is chaos in the environment in which the evolutionary process takes place, because that provides the options for

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further diversity. If everything becomes ordered and there's no chaotic environment in which the evolutionary process takes place, then you would saturate the environment and that process would break down. The Second Law of Thermodynamics states that disorder, called entropy, randomness, or chaos, is constantly increasing. And in fact, evolution is a very paradoxical result: you have this increasing order and this very elaborate, intricate structure that emerges in an environment which the Second Law of Thermodynamics says should become increasingly disordered.

Well, all of life, including all of our technology, is insignificant in terms of the amount of entropy and chaos in the environment; and the Second Law of Thermodynamics is providing ever greater chaos in the world to provide the options for further diversity. So we're certainly not in any danger over the next century, or couple of centuries, of running out of the increasing chaos in the environment, and therefore this process can continue. The order of the technology itself is yet another resource; as long as you have evolution, you have the order that it provides for the next generation. Now conceivably, there is a point at which you saturate all matter and energy with very highly evolved intelligence and run out of chaos in the environment. But if you examine that mathematically, the amount of chaos that exists, let's say at the quantum level, is so vast, even if at the point when you've created intelligent entities that are trillions and trillions of times more powerful than all of human intelligence today. Maybe it will saturate at some point, but way beyond our ability to conceive of intelligent entities today.

Audience Member: What is your technical background?

Ray Kurzweil: My technical background is something called pattern recognition which is part of artificial intelligence. It's building systems that recognize patterns, like printed letters or speech or objects on the table, and so on. And the methods we use are in fact what Edward Rothstein referred to, which are models of biological systems. They are chaotic methods; one method is called neural nets, which is based on these mathematically simplified models that we think of as networks of biological neurons. Another method, called evolutionary algorithms, emulates evolutionary processes in the computer. Sometimes called genetic algorithms, these systems share the chaos and unpredictability of the biological world because they are attempts to model the biological world. But that doesn't mean the decisions they make or the equilibriums they reach are meaningless—quite the contrary.

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If we look at the human brain, it works almost entirely by pattern recognition. We don't have time to think very much in real time about new situations. So, for example, if you look at chess master Garry Kasparov, he doesn't have time to think in real time, "Well, if I go here, he's going to go there, and then I'll go here, and he'll go there." He can only think of maybe a few dozen or a few hundred of those situations in the time he has to move. Deep Blue can actually think of three hundred million of those kinds of board situations per second; so how does Kasparov have a chance against a computer?

Well, he uses his pattern recognition to access a mental database of situations he has thought about before, that is to say, during his entire life. That's why it takes so long to become a chess master: he has mastered a hundred thousand positions and thought about them in some depth. So while he's playing, he sees a situation and his pattern recognition says, "Oh, this is like that board position that grand master so-and-so had last year when he forgot to protect his trailing pawn. I better protect my trailing pawn." I actually suggested to Murray Campbell, who is the head of the Deep Blue team, that he combine this very fast brute force method of thinking about move-counter-move situations with a neural net that would actually be able to do pattern recognition, and train that neural net on every master game of the century. He thought that was a good idea and we set up an advisory panel to design the project using this idea, but IBM canceled the project. But this is the essence of human intelligence, and at least in this one field of artificial intelligence, we use those techniques.

I have a project right now called Fat Kat—that stands for Financial Accelerating Transactions from Kurzweil Adaptive Technologies—which is applying neural nets and evolutionary algorithms to predicting the stock market. We feed in all of the data, a lot more of it than a human being could look at, and it's very chaotic data—there's a lot of "noise" in that information. If you look at, let's say, commodity prices, we say that the signal has a lot of "noise," which is to say there's a random element which is unpredictable. But that doesn't mean it's all noise, or all randomness; there is a signal amidst the noise and these powerful mathematical techniques can find that signal and use it. We actually simulate evolution in the computer: we have a million little investors, with their own software-based "DNA" that defines their rules for investing money and we actually have them compete on real-market data. Then we dispense with the ones that didn't exceed market averages and leave the ones that did well, and have them procreate through a simulated sexual reproduction where we have progeny that take a piece of genetic

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code from a father and from a mother, and we create new descendants. Then we have this new generation compete on real-market data and go through thousands of generations of simulated evolution; at the end, you have the survivors who actually have evolved very intelligent, clever methods for investing money in the market and can outperform experienced human analysts. It's an unpredictable process because, even though we've programmed it, we can't predict what this final generation will do and there's no shortcut to it. We actually have to run through this process (very powerful computers process this data for weeks). Then it comes up with some very unpredictable results, but can make decisions based on those final rules. So these systems, while unpredictable, do make intelligent decisions—just like humans.

Gunther Stent: I would like to make several comments. First, I don't see how the Second Law of Thermodynamics, which asserts that the entropy, or disorder, of an isolated system increases over time, has anything to do with the subject of our discussion. We are talking about people and their societies, which are not isolated systems.

Second, it is not the case that the belief in progress is a very ancient idea. On the contrary, it is a very recent idea, which dates back only to the Industrial Revolution of the seventeenth and eighteenth centuries. Prior to that time, the canonical view, such as that expressed in ancient Egyptian and Greek myths, was that the history of the human condition is regressive rather than progressive: history began with a Golden Age, when a golden race of happy people dwelt on earth. Their felicitous condition came to an end when Pandora lifted the lid of her box and allowed the spread of previously unknown evils. And since then, things have steadily gotten worse and worse, finally culminating in our own awful Iron Age.

The reason for this ancient belief in regressive history was that the rate at which progress did occur was too slow to be perceptible. As a rule, the world into which people were born was either the same as that from which they departed, or, if there were any perceptible changes, they were always for the worse, such as those brought about by pestilence, war, or natural disasters. It was only with the advent of the Industrial Revolution that progress became fast enough that the improvements in the human condition became perceptible within single lifetimes, and the idea could arise that maybe things were actually getting better on the whole and not worse.

Third, the person who noticed that the rate of progress increases exponentially was not Turing but Henry Adams, in his work *The Education of Henry Adams*. His observation became known among

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historians as "Adams's Law of Acceleration." He also identified the underlying cause for his law, namely that the more people know, the easier it is for them to take the next step forward.

Fourth, in the 1960s, I used to try my hand at futurism, and the one argument that was absolutely forbidden among futurists was the proposition that your prediction is unlikely to come true because some other persons had been wrong previously in making some similar prediction. This argument was considered unprofessional, because it killed all further conversation. Anyone who wants to be taken seriously in a professional discussion about the future and in his or her rejection of some prediction has to come up with some rational counterargument other than that some people have been wrong before in making a similar prediction.

Fifth, I doubt Mr. Kurzweil's prediction that, having accumulated an enormous mass of relevant data about the brain, such as its detailed anatomy and timed patterns of neurotransmitter profiles and neuronal activity we will have reached, by the middle of the twenty-first century, an understanding of the brain sufficient to make a working artificial replica of it. My counterargument is not that others have tried to replicate a brain and failed, but that the complexity of the brain transcends that limit beyond which one cannot be sure that one has all the data necessary for replicating that object. Consider the weather, for example. We still don't have an adequate meteorological theory for making reliable long-term forecasts, and the weather seems like a much simpler system than our brain.

Edward Rothstein: I wasn't actually making the argument that because predictions of the future have been wrong in the past Ray's must be wrong as well. I was pointing out that even though predictions about technology are almost always wrong, we have an urge—a need—to make them. I was trying to outline the context in which such predictions take place. I did not make the argument that wrong predictions in the past necessarily imply wrong predictions in the future, or even that they do in this particular case.

The other issue raised is this idea of progress. I was arguing that technology has become the repository for the idea of progress. Yes, I agree with you about the religious past. Progress has its origins in a religious notion of time. And in that sense it is ancient. But the modern idea of progress, I think, developed long before the Industrial Revolution. I think it must have been of some importance during, for example, the sixteenth and seventeenth centuries—eras of exploration in which modern science began. Before the sixteenth century, China had a more

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advanced civilization in many respects than Europe. But once the Western concept of a scientific law emerged—a law that held true not just in particular instances but in all cases at any place—something must have changed in how we thought about what we knew and what we didn't know. The scientific project was an attempt to expand and explore this notion of law. This led to a progressive way of thinking about knowledge.

Jacob Weisberg: Ray, would you like to respond to Gunther Stent?

Ray Kurzweil: I appreciate your comments, Gunther. I'm glad we had an opportunity to interact; I think you have made some good points. Let me respond to a few of them. First, the Second Law: I'd certainly agree with you that the Second Law is not terribly relevant to the century we have ahead of us. There's more than enough chaos in the world already to see us through it. But there is a difference between closed evolution and open evolution: when we simulate evolution in the computer, we have a very closed system and we provide it with a certain opportunity for chaotic behavior, but it's limited by the simulation that we've set up, the parameters we have, the size of the computer, the amount of data, and so on. These systems will follow an exponential curve: the evolutionary process accelerates, then levels off because there's only a certain amount of chaos that we've provided in this little simulation. It's sufficient to do a very good job on some tasks—like making predictions of the stock market—not perfectly, but enough to actually make money. But it is limited by the amount of chaos in that system. The evolutionary process we see on earth, which started with the evolution of life forms and has now been supplemented by an evolutionary process guided and graded out of the brains of a technology-creating species, takes place in a relatively open environment, and at least has available to it all of the chaos in our midst and not necessarily just on earth.

This human-machine civilization will extend beyond the earth. It will be open to the universe and take advantage of all the chaos available to it, all of the entropy. If you want to talk about the ultimate destiny of this evolutionary process, then I think the Second Law of Thermodynamics is relevant, but I would agree with you that it's not relevant to the predictions over the next decades or even the next century. Your point on the Industrial Revolution is a good one because it was around that time that change occurred frequently enough to occur in the midst of, and affect, people's lives.

A thousand years ago, change was much faster than it had been five thousand years before, but paradigm shifts were far greater than a

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person's lifetime, so people didn't really notice. And even in this century, people didn't notice, by and large, the exponential growth of computing until the mid-sixties when Gordon Moore came out with his first version of Moore's Law and then in the seventies refined it. Even then, it was only known among a small group of computer scientists. The general public has caught on to this only during the last few years. Exponential growth starts slowly and is flat and unnoticeable for a long time until it reaches that explosive knee of the curve.

David S. Rose: I found today's discussion fascinating. If one accepts your prediction of the development of true artificial intelligence, and combines it with logically equivalent developments in prosthetic robotics, it is easy to envision a time not far off when we will truly be living in the world that Isaac Asimov created in his "I, Robot" series. However, I followed your thought process all the way up until the final two minutes of your presentation. By that point, you had us convinced that super-intelligent creations (call them robots, or simulacrums, or avatars, or spiritual machines) will exist with intelligence and, we can also assume, with physical capabilities far in excess of the humans who created them. But then in the next breath you dismiss the alarmist idea of "hordes of evil robots coming over the hill." While I don't necessarily disagree with you, I also don't see how you can come to that conclusion. It seems to me that after a carefully reasoned series of technical projections, you are taking a leap of optimistic faith that things will somehow just work out for the good. Is there any way to realistically predict whether the "hordes of robots" will be evil, benevolent, or completely without character?

Ray Kurzweil: That is a good point. I think there are a lot of possible downside scenarios, and I talk about them in the book. One downside scenario that is commonly posited is that when you have these non-biological entities that are much more intelligent than humans, they are going to be quite powerful. What are they going to do with the rest of us? Maybe they won't see much use for us. Another downside scenario involves nanotechnology; it will be immensely powerful by the end of the twenty-first century, and we will be able to create any physical entities we want with nanobots. But in order for these nanobots to be useful, you need billions or trillions of them. The only way to create that number is to have them self-replicate. That's the same solution that nature, or biological evolution, found. We get from one cell to trillions of cells that make a human being through self-replication. Well, all of those cells need to know when to stop self-replicating; if any of them forget and all the

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descendants of that entity will have similarly forgotten how to stop self-replicating, that becomes a biological cancer. Since nanotechnology is actually much stronger than biological technology, for example, it operates in a much broader temperature range, and it is physically stronger and potentially more intelligent; such a non-biological cancer would be more dangerous than a biological cancer.

So, there's no shortage of downside scenarios, and, as I said earlier, the story of the twenty-first century hasn't been written. I think that in large measure the intimate connection between biological and non-biological intelligence will be the case. That doesn't mean that the other scenarios are mutually exclusive. We'll have non-biological entities that may have no, or very little, human connection, and that may be dangerous. There are going to be many dramas in the twenty-first century.

But we will also be expanding human intelligence through non-biological intelligence. For instance, there are already quite a few examples of neural implants today: I have a friend who was profoundly deaf and I can now talk to him on the telephone because of his cochlea implant; there are Parkinson's disease patients who have implants that replace the locus of cells that are scrambled in Parkinson's. Dr. Benebid of France makes a very dramatic demonstration—he can control the device used for the demonstration from outside through wireless controls—which is a little scary. He has Parkinson's patients wheeled in while he has the device turned off; they are rigid and immobile and in an advanced stage of the disease. When he flips the switch, which turns the implant on, they suddenly come alive, so to speak. So, we're in the very early stages of neural implants, and of supplementing our capabilities either outside or inside our bodies and brains through various forms of technology. That's going to happen.

One argument one might make is, "Okay, so we're going to go down this path and eventually we'll all be using neural implants." But another challenge is, "Well, this is interesting, but how many people are really going to want to get brain surgery to put implants in? It's one thing if you have some profound disability or disease, but for the rest of us, there's going to be much resistance to brain surgery." In response to that argument, I recently wrote an article on the non-invasive, surgery-free, reversible, programmable, distributed neural implant we can introduce through nanobots. These nanobots can travel non-invasively through the bloodstream and are reversible because they can all be programmed and ordered to leave. They will enable us to actually extend our minds and will be more powerful than a neural implant that's placed in one location because they can be in billions of locations. So that is one way of non-invasively combining biological and non-biological intelligence.

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Then people say, "Okay, today non-biological intelligence for the human race is growing exponentially and biological intelligence is stuck at 10^{26} calculations per second. It'll be 10^{26} in fifty years, while the non-biological is growing exponentially, so ultimately it will dominate." However, that non-biological intelligence is emerging from the human civilization. What I am pointing out is that there will be many scenarios—copies of the human brain modified, extended; designs made by human brains that then evolve—but, it will all be coming out of the human machine civilization and will be deeply influenced by, and derivative of, human ideas and the design of human thinking itself. It will have many human characteristics, and in my view, it is the next stage of evolution. But whether it will have a malevolent outcome or will further our shared human values (not that we have an absolute consensus on what those are) remains to be seen.

Rita Kramer: Since these very brainy machines can be used for ill as well as for good, are there precautions against their abilities?

Ray Kurzweil: Yes, absolutely. There are already discussions about guidelines. We have, for example, very detailed guidelines for bioengineering designed to avoid the kinds of dangers I talked about. They don't absolutely rule them out; I mean, some malevolent mind might get this expertise and wouldn't necessarily follow all the guidelines. But we do have lots of rules, although obviously there is controversy as to whether they're sufficient. I was at a conference organized by the Foresight Institute, which is a leading nanotechnology think tank, about devising similar rules for nanotechnology and artificial intelligence (particularly when you get to self-replicating entities) to avoid the kind of dangers I've talked about. I think we will have a lot of discussion about how to guide the technology towards constructive ends.

David Sidorsky: In many discussions of the positive benefits that often follow exciting developments in technology, there is a tendency to assume that these must lead to a general improvement in the human condition. I'm reminded of the response to the first science fiction novel written around the turn of the century by H.G. Wells. Although Wells had been able to describe in imaginatively detailed terms the function of the new machines, whether of invisibility or of time travel and space exploration, he was challenged for being unimaginative and deficient in his invention of his characters. Thus, the motivation for the characters

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of his narrative remained the age-old struggle for "the girl and for the gold."

Wells's reply to this criticism was to affirm his belief that future technology would transform the human condition including the kind of motivation that would be present in a more advanced age. He conceded that it was his gift and his limitation as a novelist to be able to envisage some of the future of technology and not to be able to discern the future of the psychological changes that would be wrought.

A century later, however, we have witnessed many brilliant applications of technology which have been used by an apparently unchanged human nature, including well-known instances of aggression and behavioral regression.

There is no need to enter into a survey of the great historical events of the twentieth century that provide the evidence for this dichotomy between technological progress and institutional regression. Even in terms of the everyday environment in which we find ourselves, technological improvement does not consistently lead to institutional improvement. It can be argued that despite technological improvements that solve some problems, most American cities when evaluated by using reasonable criteria are not better than they were fifty years ago and major American universities, particularly in the humanities, are not as good as they have been. It is not strictly relevant but it need not be intellectually harmful to take note of the fabulous technological improvement in the reproduction of artwork and musical performance which exists alongside, what seems to me, a significant drought or impoverishment in artistic and musical creativeness.

This suggests some skepticism on the role of technological change (such as the revolution in communications and in facilities for publication) as the crucial causal factor in the breakdown of the Soviet Union. Even with the widespread distribution of telephones or Xerox machines to dissident populations, there is no substitute for traditional political wisdom in the formation and implementation of public policy. Similarly, technological change does suggest challenges for a totalitarian or authoritarian regime in China, but it would be illusory to believe that the new technology could not be made to coexist with political repression. The technological development of "smart" missiles certainly did reduce American casualties and turn the tide of war in Kosovo. Yet this does not resolve the issue of whether an alternative diplomacy which would have negotiated an expansion of the civilian observer force (previously accepted and functioning), which had to be withdrawn at the

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outset of the war, would have been effective in avoiding both the bombing and the "ethnic cleansing."

If I were to try to formulate a general statement of the problem, it would be that progress in any historical situation or social institution involves technological development as it interacts with other features of the human condition such as cultural habits, religious traditions, moral standards, and psychological understanding. This implies that the technology will be open to good use, underuse, overuse, disuse, misuse, abuse, and bad use. The counterclaim to this cautionary note has usually been the visionary view that the technological change will inevitably result in a better scientific understanding of human nature with a promise of the transformation of human motivation. The point of the question is whether there is evidence that the rapid scale of technological change sketched so wonderfully by Ray Kurzweil will bring with it any grounds for refuting a belief in the relatively constant and unchanging state of human nature through many centuries.

Ray Kurzweil: Let me say a couple of things. First of all, in terms of cities and universities getting better or worse—as paradigms—they may be reaching their peak or be past their prime. We do have new forms of human discourse and communication emerging: the World Wide Web has become a very powerful way of sharing information and has supplemented the discourse that might have taken place exclusively in universities. It's certainly spreading out the work environments so people don't need to live in cities. But I didn't call the book *The History of the Twenty-First Century*. As I said, the story hasn't been written yet, and human nature is filled with glorious achievements as well as malevolent deceit. All of these qualities and tendencies are there; they affect technology, and then technology amplifies human conduct. These are the types of forces and technologies we'll see in the twenty-first century. We will see their applications. We will get some greater insight into human nature when we can understand it; we understand some of it through psychology and neurobiology and so on. When we can actually see the entity of the human brain and reverse-engineer the endocrine system, we will have much greater insight into human nature and human dysfunction. Hopefully, we'll apply that to constructive ends, but there too one can certainly imagine malevolent scenarios.

Edward Rothstein: David, I'd also like to respond. In science fiction, there have always been these contrasting visions of things: one is the utopian, the other, dystopian. In discussions of recent technology, this

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has also often been the case. For the last four or five years, one could pick up almost any copy of *Wired* magazine and hear about how human nature is being transformed. I don't mean just human abilities to communicate, but human nature itself. And there was some sense that in the creation of the World Wide Web what we'd be creating was some world-sized organism that now follows its own laws and is going to create a new form of humanity with this incredible nexus of machines and people interacting in new ways. I don't believe this is the case. I agree with you, and I think that one of the strong cases for a dystopian vision, as far as technology is concerned, is that technology increases the ability of human nature to do its worst. This is the downside of technological advance. But again, I don't know that Ray is making that a central point of his argument: the argument is really that, regardless of what we say, this kind of technology is going to be changing in this way, creating a challenge for us as social beings to try to figure out what to do.

Ray Kurzweil: I will admit to being an optimist and, of course, it's said that an optimist is someone who, when he falls from a ten-story building, is heard to say as he passes the fourth floor, "So far things have gone well." And let me say that, so far, I think things have gone well, but not without much pain. This century has seen several enormous catastrophes and a great deal of destruction made feasible by different forms of technology. On the other hand, I don't know how many people would want to go back a few hundred years to the very difficult, grueling, brutish lives—short lives, disease-filled lives—that people then lived. Technology has enabled far greater wealth and control over our destiny; a significant fraction of the population have jobs they actually get some gratification from, something that a very small percentage had a hundred years ago. So whether technology is a good thing or bad thing is an entirely different issue. So far, I would say the consensus is that technological progress, if I may use the word "progress," is positive, has very strong support, and many benefits are gained from it. But the dangers are certainly salient and could ultimately be overwhelming.

Ken Welch: There's no doubt we've had a technological explosion over the last fifty or sixty years, but there has also been a population explosion, and I think the world's population has doubled in the last forty years. Some of the correlations are obvious. For instance, improved medical care helps people live longer, but what other correlations do you see? Do you see either of those factors limiting the other as the number of people increases so dramatically?

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Ray Kurzweil: The population explosion is not terribly relevant. The economic growth and the growth of technology vastly exceeds the population explosion which has been much smaller and is, in fact, leveling off. If you look at economic growth over the last seventy-five years, you see that it is also an exponential; the economy has been growing and the rate of growth has been growing—slowly, but it has been growing. The whole Social Security debate is incredibly short-sighted. It's based on models of future economic growth of about 1.3 percent per year, which is lower than the seventy-five-year average, dramatically lower than the last ten-year average: the economy's been going up. Now suddenly it's going to shift down to this very slow growth rate? If you make that 1.6 percent, which is still dramatically lower than what we've seen in recent years, or even lower than the last fifty years, you don't have a problem with Social Security thirty years from now. It's just amazing to me that you could have this very hot, active, contemporary debate that both the Democrats and Republicans pay homage to about some crisis decades away, based on an economic model that is—even if you ignore the new economy—completely out of sync with what we've seen. But technology is certainly driving economic growth, so at least in the material world we are far better off and continue to be through this exponential progress of technology.

Mark Mirsky: I feel hopelessly old-fashioned in addressing this to you, Edward, but I was puzzled by your remark that you didn't see the idea of progress outside of science. And it seems to me we went into Kosovo and other places because we are totally mesmerized by the idea of becoming better human beings, and that science in every possible way is a result of the notion that we are going to become better human beings. I think it goes back to the Greek notion of learning you find in Plato, that learning is a form of progress—that progress is made through learning. One thing that strikes me is that scientists tend to be incredibly naive when they leave the world of science and come to the world of human, social beings. I mean human in terms of biology, sex, social interaction—I don't see the computer really understanding this complex world. I would even suggest that one of the reasons for growth of the Web was the kind of sexual freedom it brought with its access to pornography. Orthodox Jewish friends, mathematicians, talked about colleagues who were so fascinated that they were driven to their powerful computers to see what kind of a virtual world they could enter.

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Jacob Weisberg: Orthodox Jewish mathematicians reading pornography on the Web—how many friends like that do you have?

Edward Rothstein: Let me clarify what I was trying to express about progress. I don't think that the notion of progress is nonexistent outside of technology. I do think, though, that there has been a dramatic change. At one time, there was a strong argument, *à la* Hegel, that a progressive evolution of human consciousness was taking place. Later, *à la* Marx, a progressive evolution of human society was asserted. These ideas—and many others that have defined a progressive course for humanity—are no longer tenable. There are still Hegelians and Marxists just as there are still religious people who believe that progress will take place according to these old models. Even the ideology of democracy can have a progressive element in it; for example, the argument has been made that democracy provides a stable point at which history and social evolution is going to come to an end. But I don't think that most of society thinks about life in this way, believing either in the stability of our current status, as the culmination of a long progressive road, or in the evolutionary status of human history, in which we are proceeding to even greater levels of enlightenment or justice. My sense is that, generally, people feel that whatever we have got here, we want to keep getting or keep improving, but that we can't rely on some notion of inevitable progress. And in fact, the only place we can see progress taking place, not as a theory or a hope or a belief, but in tangible, concrete ways, is in the development of technology. Technology has become an unusual repository of human hopes and aspirations right now; but elsewhere the notion of progress is not as strong as it once was.

Mark Mirsky: Just one tiny rebuttal. I'm a professor at a university which I feel is often paralyzed by ideas of progress—ideas of particular human studies, black studies, Puerto Rican studies, Jewish studies, and so on. This notion of progress has so mesmerized City College that it seems individual programs forget their debt to the broader world of the humanities.

Edward Rothstein: Okay, but this is going to lead us into a whole other discussion. Maybe I'll retreat a little from my broad point. The idea of progress does indeed live, but it's fairly sickly, while technology has this aura around it that now seems fairly invulnerable. We can discuss these various other eruptions and incidents another time.

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Ray Kurzweil: Let me say a couple of things. First of all, sexual themes have been a major driving force in the adoption of new communication technologies since Gutenberg. The first book was the Bible, but the century after that the majority of books published had prurient themes, and sexual themes have certainly driven videotapes and movies and now the Internet. And I do think these communication technologies have a profound impact on human discourse and cultural history. It is a democratizing force. I think it's a large part of the movement towards democracy in the last ten years or so, because information is power, and it has always been the case that totalitarian or even authoritarian governments would seize the radio and TV stations. They could then control the flow of information. That really has been broken, even in China, although you still have a government that has a kind of split personality: tremendous Internet usage and communication ultimately is transforming China despite a rigid, or at least authoritarian, system at the top.

Cynthia Colin: I think we've been skirting the word "politics" a great deal here. What do you think would be the way to educate people about the issues that we've been discussing? If you were to devise a curriculum for the newly educated person, what would it include? Would you want to have the making of the atomic bomb in the textbook? How can the less ingenious person think about these issues?

Edward Rothstein: I think a curriculum already does exist: read Plato, Aristotle, Hobbes, and so forth. As David Sidorsky mentioned, no matter what the technological issues are, there's an unchangeable substratum and it remains no matter what tools we invent, or how large a part they play in our lives. So I think one of the problems is not that we are taking these works of the past too seriously and not taking into account enough of the technological changes—the problem is that the curriculum doesn't take these works seriously at all, and instead chooses to emphasize the present and the political. You might get a degree in Web site design and be totally unable to make sense of who we are or how we should act.

Ray Kurzweil: Well, if I can just change your question a little bit. I'm often asked how people can best prepare for, let's say, economic viability in this emerging world; should they be taking a lot of computer courses, and so forth. I advise people to follow their passions, because we're entering a world where knowledge, in any of its forms, whether it's music, art, literature, or technology, is the wealth and capital of nations,

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corporations, and individuals. As a practical example, I have friends who are graphic artists who could barely make a living just two or three years ago and who are now making good six-figure incomes and are in incredible demand to create graphic material for the Web. The Web is empowering all kinds of creations, whether in visual art, music, video, movies, or knowledge about eighteenth-century painting. Whatever your passion is, it has tremendous value. And you're only going to be able to create knowledge if you master an area of knowledge to build on; to do that, you have to have a passion for something. That's what people should pursue because I think this new technology is very empowering for almost every kind of interest.

Audience Member: Ray, you discussed your financial company that is simulating existing systems that can help you make a lot of money, with this new bot. But what happens when you start applying these analyses to non-financial things, such as the Prisoner's Dilemma, where you have more of a real-life case of sociological interplay and where things are tit for tat. What is the ultimate bot out there in terms of human interaction? Do you think humans will ever look to this kind of research to help them live their lives?

Ray Kurzweil: The Prisoner's Dilemma is a good example of the value of communication because if, in fact, the two prisoners can communicate, then they can make a deal and have the best outcome for both of them, and it's only a dilemma when they can't communicate. We have many analogues to the Prisoner's Dilemma in the world from just ten years ago where people couldn't communicate. You have the Prisoner's Dilemma in a totalitarian structure where the entire population can't communicate and all communication goes through a central authority. I think one of the great aspects of the World Wide Web is that it is empowering individuals. It is changing the relationship between, for example, individuals and their doctors, and it's changing many types of institutions. So, the Prisoner's Dilemma is a good example of the power of communication, and enhanced communication is one of the powerful results of this new technology.

Jacob Weisberg: I want to thank both of our panelists for really lucid, and, at least for me, mind-expanding presentations, and also the audience for asking good questions. Please give them, and yourselves, a hand.

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Knowledge and Information Technology Symposium

Session Two

Edith Kurzweil: Welcome back. Richard Grimm will moderate this afternoon's session. He's an assistant attorney general of the state of New York and in the Antitrust Bureau, where, among other things, he has supervised the investigation of various mergers. He received his B.A. in government from Wesleyan University, and has specialized in antitrust practices and litigation since his graduation from Yale Law School in 1971. He served as a senior trial attorney in the U.S. Department of Justice in Washington from 1977 to 1981, has been counsel to a number of law firms, and has handled international and antitrust litigation. He is also a member of the Advisory Board of *Partisan Review*, and the board chairman of the Annabella Gonzalez Dance Theater, a modern dance company. Richard will take over now.

Richard Grimm: Thank you, Edith. Although this morning's panel of Ed Rothstein and Ray Kurzweil will be difficult to top, we have excellent panelists this afternoon as well. Guy Burgess, who will speak second, is the co-director with Heidi Burgess of the Conflict Research Consortium at the University of Colorado at Boulder, where he received his Ph.D. in sociology in 1979. He has done policy research as a fellow at MIT; and has published books and monographs, and written for Web sites, about conflict resolution. He has covered not just what we in the legal field would consider alternate dispute resolution, but also all kinds of situations that arise in daily life, involving such matters as charter schools and community environmental conflicts. He is a big proponent and expert in using Web-based technology in order to develop information that people in the field of conflict resolution can share. He will be discussing the relationship of these technologies, and whether culture and social trends really are keeping up with the technological issues we were hearing about this morning. Thus he will be able to address the kind of issues that David Sidorsky raised about what technological development is doing to our culture and to our social life.

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Gunther Stent is Professor Emeritus of Molecular Biology at the University of California at Berkeley. He has been one of the leading scientists in the field since the 1940s. He received his Ph.D. from the University of Illinois in 1948 and was a member of the famous Phage Group put together by Max Delbrück at the California Institute of Technology. In 1952, he became a professor at the University of California and was chairman of the Department of Molecular Biology from 1980 until 1992. His current research interest is the embryological development of the nervous system. Despite someone's comment this morning that few scientists have gone on to become deep thinkers about social issues, he has written extensively on the history and philosophy of science, and has published an autobiographical memoir, *Nazis, Women, and Molecular Biology*. He is a member of the U.S. National Academy of Sciences and many other professional and scientific groups, and he has received numerous awards. First, Gunther Stent will address some of the issues we heard about this morning. He will focus in particular on the study of consciousness and how technology relates to that. Professor Stent.

Gunther Stent: Four deep problems that had been central to biology ever since Aristotle founded that discipline in the fourth century B.C.E. were solved during the twentieth century.

Metabolism. How living creatures derive the energy they need for driving their transactions and synthesizing the chemical substances of which they are built was solved by application of the biochemical methods that began to be developed during the latter half of the nineteenth century.

Heredity. The understanding of how like begets like among living creatures began with Gregor Mendel's discovery of the discrete entities later called "genes," and culminated in the mid-twentieth century with the discovery by James Watson and Francis Crick of the structure and mode of self-replication of the DNA double helix.

Embryonic development. In the 1930s, many embryologists were inspired by the success of the research on metabolism and tried, by use of the methods and insights of biochemistry, to account for the process by which a fertilized egg develops into the mature adult form of its species. They failed because they still lacked in understanding the regulation of gene expression, which molecular biology would provide only in the 1960s and 1970s. But by the end of the twentieth century, embryology was well in hand, and many of its fundamental questions had been answered; yet the overall mechanism that steers the developing embryo towards its telos—the ultimate adult state—still remains somewhat mysterious.

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Organic evolution. Just as was the case for the other three deep problems, the first big breakthrough towards an eventual solution of the enigma of the origin of species came in the middle of the nineteenth century, when Charles Darwin presented his theory of natural selection. By mid-twentieth century, classical Darwinian theory had been given a sharper formulation by the "New Synthesis" of neo-Darwinism, which brought the quantitative concepts of mutation rate and population genetics to bear on organic evolution. Some modifications of neo-Darwinian theory became necessary, however, in the latter part of the twentieth century, upon the application of the insights of molecular genetics and embryology to the explanation of evolutionary processes. Prominent among these latter-day insights was the realization that most historical changes in molecular evolution at the level of DNA were neutral with respect to the Darwinian "fitness" concept and are attributable mainly to stochastic rather than selective processes. Molecular evolution thus came to be distinguished from morphological evolution at the level of gross phenotype, at which natural selection does play a major role.

The unsolved biological problems happen to be the most difficult, for the not surprising reason that the easier problems are always solved before the more difficult ones. The deepest problem connected with organic evolution, the very origin of life itself, still lacks a credible, coherent proposal for its solution. Perhaps, as a historically unique event that left no traces, the origin of life may be intrinsically insoluble. Despite its obvious importance (and the certainty of a Nobel Prize for its solution), few biologists are working on the origin of life, probably because of its seeming intractability.

Probably the deepest of unsolved biological problems, and hence, according to the deep heuristic principle promulgated in the preceding paragraph, destined to be the last of them, is the consciousness provided to us by our brain. In fact, until recently, the problem of consciousness appeared so deep that it seemed to be a philosophical rather than biological matter. One reason usually advanced for excluding consciousness from the realm of biological problems is the subjectivity of the experiences it provides, or what the philosopher John Searle referred to as "first-person ontology." The subjectivity of conscious experiences is reflected in some of their qualitative aspects (or "qualia"), such as the redness of the setting sun or the salty taste of sea water, which cannot exist in the absence of a conscious living observer. This argument contrasts the subjectivity of consciousness with the objectivity, or "third-person ontology," of such natural phenomena as the spectral attributes of the light of the setting sun or the salt concentration in sea water, which can (and did) exist even in the absence of any living creatures.

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As Searle has argued, the aspects that make consciousness different from all other biological phenomena do not exclude it from their realm. Since consciousness is obviously the product of processes that occur in our brain, understanding it is obviously a biological problem, albeit an especially difficult, fascinating, and troublesome one. For that very reason, the study of consciousness has recently become very *à la mode* among the romantics in science, the Faustian types who constantly measure themselves against the infinite. They include Francis Crick, surely one of the greatest theoreticians of biology since Darwin, who has been working on the consciousness problem for the last ten or so years.

Crick proposed that the search for the neural correlate of consciousness, or NCC, ought to be the main agenda for people in quest of understanding consciousness. Unfortunately, Crick's specific conjecture regarding the nature of the NCC, namely that it is represented by a synchronous impulse rhythm at a frequency of 40 Hz of some neurons in the thalamus and the cerebral cortex, has not worked out so far.

Ray Kurzweil remarked in his presentation that if the project of securing a total understanding of the brain did succeed, this would radically change the human condition. I agree with his prognosis, but probably not for the same reason that I suppose led him to make it, namely that we would have an enormously better comprehension of what makes people act as they do. Securing that total understanding of the brain would entail the end of humanity as we know it. Since our pivotal transcendental belief about persons is the essential opacity of their minds, the world of mankind would turn into a dramatically different place once the human mind had been rendered transparent by the kind of neuroscientific analysis of the brain Ray Kurzweil has in mind.

I don't believe, though, that there is any cause for worry, because I deem it highly unlikely that the project outlined by Ray can actually succeed. Admittedly, in view of the likely future technical improvements in making measurements on the living brain that he envisions, there seems to be no limit to the data that we can eventually obtain. But there will be no way of making much heuristically productive use of these massive data unless a credible theory had been developed that would allow their interpretation. The reason why no such theory is on the horizon is not that we still lack sufficient data about the brain, but that the system is too complex for being captured analytically in its totality.

What is the meaning of "consciousness"? The first difficulty that a student of consciousness encounters is the explication of its meaning in sufficiently concrete terms for investigating it scientifically. To explicate some difficult term, it is often helpful to consider its antonyms to make

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clear at least what is not meant. The antonym of "conscious" is "unconscious." Unfortunately, there exist two different explications of "unconscious," which are at least partly responsible for the conceptual confusion that has brought on the philosophers. The more commonly understood explication refers to the global absence in a person of awareness, sensation, and cognition. This is the meaning of "unconscious" that is of interest to anesthesiologists who have some understanding of the phenomenon in terms of the neurobiology of the brain stem gateway to the cerebrum. But it is the less commonly understood meaning of "unconscious," which refers to a selective absence of awareness of some particular sensation, memory, or emotion in an otherwise fully conscious person, that interests psychobiologists. They want to understand something more subtle about mental states than being "conscious" in the sense of being wide awake rather than totally out.

It's a pity that Sigmund Freud used the ambiguous term "unconscious" in his description of the selective absence of awareness (or "repression") of remembered experiences, whose role in personality formation was one of his main psychoanalytic propositions. He would have been better served by another antonym of "conscious," namely "subconscious," whose explication is restricted to the subset of mental processes of which an otherwise fully conscious person is unaware. In my following attempt to clarify the status of the consciousness problem I will use the terms "subconscious" and "unaware" as the antonym of "conscious."

One of the few indisputably true statements that can be made is that consciousness is a phenomenon that is associated with our brain. It seems likely that the principal biological function of consciousness is the interpretation of the information gathered by our sensory organs and the construction of an integrated, global panorama of the ensemble of those interpretations.

A leading contemporary investigator of consciousness, the neuropsychologist Antonio Damasio of the University of Iowa, has formulated a more subtle explication of consciousness in terms of the psychologically central concept of the self. On the basis of his studies of the cognitive deficits of brain-damaged subjects, Damasio has divided the phenomenon of consciousness into three (phenomenologically) distinct sub-categories, which he designates as proto-self, core self, and autobiographical self.

The proto-self is a gathering place at which the input from the sensory organs first enters the brain and whence it is conducted to successively higher brain centers for the abstraction of sensory percepts. The mental processes of the proto-self are subconscious and, strictly speaking, not a part of consciousness. But they are a necessary prelude to it.

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At the core self stage, which is still subconscious, the sensory percepts generated by the proto-self are integrated to generate a map *moment by moment* of the physical structure of the person in her many dimensions. The core self is a transitory entity whose content changes from moment to moment and has no memory of its past contents.

It is only at the third, or autobiographical self stage that sensory percepts reach consciousness and give rise to self-awareness. The autobiographical self has memory so that persons remember what happened to them in their past and construct out of these memories what the molecular biologist François Jacob referred to poetically as their "interior statue." In other words, it is thanks to their autobiographical selves that persons are aware of who they are.

Damasio derived his three categories of consciousness from his study of patients with diverse brain lesions at the hospital of the University of Iowa Medical School. He found that subjects who lack a proto-self are virtually vegetables, lacking most mental traits characteristic of humans. Subjects who do have an intact core self but lack an autobiographical self do have some human mental traits but are still not able to function as autonomous persons. Only those in possession of an autobiographical self meet a necessary, albeit not always a sufficient, condition for a neuropsychologically hale interior statue.

Damasio's work follows in the tradition established towards the end of the nineteenth century by the first neuropsychologists of language, Carl Wernicke and Paul Broca, the eponymous discoverers of two brain areas: one is Wernicke's Area—critical for the comprehension of speech—and the other is Broca's Area—critical for the production of speech. Both require the awareness of consciousness. They had done their work by locating "natural experiments": unfortunate people who suffered brain lesions either by wounds or by cerebral aneurysms, and were unable to perform specific linguistic tasks.

Studies of a rather rare category of persons with slight damage in some very restricted area of their brains dedicated to the processing of sensory information have provided one of the most promising neuropsychological approaches to the problem of consciousness. Damasio would concede an autobiographical self to such persons who suffer from what appears to be a paradoxical impairment of their perception of one or another kind of sensory stimuli. Lawrence Weiskrantz of Oxford University, who studied them intensively, has epitomized their condition as "performance without awareness."

Awareness is a phenomenon that is more narrowly circumscribed than the kind of global personality phenomena related to the concept of the self

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formulated by Damasio. Studying this thematic reduction of the consciousness problem represented by performance without awareness shows that under certain conditions, an otherwise fully conscious person can be aware of a sensation without that sensation having reached the consciousness of his autobiographical self. Thus this abnormal specific exclusion of a particular piece of awareness from the autobiographical self, i.e., of its subconscious presence, holds out the promise of dissecting the normal neural pathways—the NCC—leading to specific conscious experiences.

One example of performance without awareness is the condition bearing the oxymoronic name "amnesiac memory." Subjects afflicted with amnesiac memory cannot remember, let alone provide a verbal account of, their recent experiences. Yet, they are able to demonstrate recall of such experiences when examined by means that do not require their verbal response. In other words, they are subconsciously aware of some past experiences without being consciously aware of them. For instance, a person suffering from amnesiac memory who has been shown the letter *A* cannot say at a later time which letter he saw. But that person is able to identify an *A* as the letter he was shown by pointing to it when it is presented along with a set of other letters.

Another striking instance of performance without awareness has been given an equally oxymoronic name, "blindsight." Blindsighted subjects who have suffered a brain lesion—typically from a cerebral stroke or head wound—report that they are unable to see anything at all, or at least in some substantial part of their normal visual field. Yet psychophysical tests in which the subjects provide their responses by body movements (such as button-pushing) rather than speech reveal that they are, in fact, able to locate accurately the spatial position of "unseen" visual stimuli. In other words, although the blindsighted subjects do see the stimuli after all, they are not consciously aware of having seen them.

The first clue about the existence of people with subconscious vision attributable to lesions in the visual cortex was provided at MIT in 1953. In the course of a psychophysical study of brain-damaged, blind veteran soldiers, the subjects were instructed to move their eyes so as to fixate on a briefly presented spot of light whose spatial position was randomly varied from trial to trial. As they could not "see," the subjects thought this instruction odd, but it turned out that their eyes did, in fact, move to the correct position. Despite being "unseen" by the blind subjects, the spot of light was evidently exerting some control over their eye movements. Soon thereafter, a person was located in London afflicted with a similar visual defect caused by surgical removal of a small benign tumor that had invaded the cerebral cortex.

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One common procedure to establish the presence of blindsight is to put the blind proband in front of a video screen that is divided into four quadrants—upper left, upper right, lower left, lower right—and flash a series of randomly placed dots of light on the screen. The experimenter asks the proband to indicate by pressing one of four buttons in which quadrant a particular dot has appeared. The subject protests. He says to the experimenter: "Didn't I tell you that I'm blind? I can't see anything." The experimenter answers: "Never mind, do me a favor and just push one of the buttons whenever I tell you that a dot has been flashed. If you really didn't see it, just make a guess."

If that blind proband happens to be blindsighted, he will be able to report location of the flashed dots to a degree of accuracy that is much higher than he could have achieved by random guessing. In other words, the subject did see the dots without having been consciously aware of them. It should be noted, though, that if the subject is asked to report a dot's position verbally, the correctness of his answers is no greater than would have been achieved by random guessing.

Blindsight is a particularly favorable phenomenon for the study of subconscious presence because the neurobiological analysis of normal vision has progressed farthest among sensory modalities. There are at least two reasons for this preeminence of vision in research on sensory perception. First, experiments on the processing of visual input are easier to carry out than those addressed to other sensory modalities because visual stimuli can be controlled more precisely and varied more widely than auditory or olfactory stimuli. And, secondly, our human language is much better adapted for talking about the things we see than about the things we hear or smell. So it is not a coincidence that brain scientists who study visual perception can report the results of their research much more clearly and in more meaningful detail than those who address auditory or olfactory perception.

The human visual pathway begins at the array of light receptor cells in the retina located at the back of the eye, whence the light-induced electrical activity is passed on to the retinal ganglion cells for the first stage of processing of the visual information. The retinal ganglion cells then pass on that information via the optic nerve to a relay station located in the midbrain. From there it is conducted via the nerve tract of the optic radiation to an area of the cerebral cortex at the back of the head designated as primary visual area, or area V1. The visual information is then passed on from the primary visual area to other higher centers of the cerebral cortex for further processing, and eventually winds up in the parietal lobe of the cortex. There it is integrated with the input

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gathered by other sensory modalities and finally passed on to the frontal lobe of the cortex for the command of body movements.

A neurological explanation of the blindsight phenomenon is available in terms of two separate pathways along which the visual input is transmitted from the midbrain to the parietal lobe. One of these pathways, referred to as the seeing system, leads from the midbrain via area V1 of the primary visual cortex to the parietal lobe and either passes through, or sends collaterals to, parts of the brain dedicated to the production of conscious awareness. Hence, if there is a lesion in area V1, the visual information may remain subconscious.

The other pathway, referred to as the on-line system, bypasses area V1 on its way from the midbrain to the parietal lobe, and thus also the cortical areas dedicated to the production of conscious awareness of the visual information. That pathway heads directly for the parietal lobe, where some of the visual information is still integrated and passed on to the frontal lobe for the command of body movements. Thus blindsighted persons are able to provide the correct response in the spot-the-dot experiment because their parietal lobe is subconsciously aware of where the dot appeared and can direct the hand to push the appropriate button (but not direct Wernicke's area to speak the appropriate words).

As it turned out, blindsight was long known to expert tennis players, who return a fast serve before they have actually seen the ball they are hitting. They are able to do so because the direct, subconscious on-line pathway from the midbrain to the parietal lobe is faster than the conscious route of the seeing system via area V1.

The existence of the two separate visual pathways from midbrain to parietal lobe—one indirect, conscious, and slow, the other direct, subconscious, and fast—bids fair to provide an opportunity for finding the neural correlate of consciousness, or NCC. It ought to be possible to identify the NCC by comparing the neural activity patterns of various cortical areas during similar visual experiences of normal and blindsighted subjects. Thus far, this obvious approach has not provided the sought-after information, largely because of the difficulties entailed in making highly localized recordings of nerve cell activity from the living human brain.

Two novel methods for imaging cerebral nerve cell activity became available towards the end of the twentieth century, however, that hold out promise for gaining a better understanding of some long mysterious cognitive functions of the brain. One of them is positron emission tomography, or PET, and the other is functional magnetic resonance imaging, or fMRI.

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Prior to the introduction of these novel methods, there were only two very limited methods available for the neurological study of cognitive brain functions. One of them consisted of examining the performance of people with particular cognitive deficits while they were alive and then, after their death, performing brain autopsies to identify their neuroanatomical abnormalities. This was the method by which Wernicke and Broca identified their eponymous cerebral areas involved in the interpretation and production of speech in the latter part of the nineteenth century. The other method, electroencephalography, or EEG, was developed in the 1930s by Hans Berger. It consists of placing electrodes on the scalp and recording the medley of electrical signals emanating from the underlying brain areas. The EEG method can reveal whether an unconscious person is or is not brain-dead, but it can only provide very crude information about the localization of cerebral activity.

Both PET and fMRI involve the recording of patterned emission of photons from brain tissue by a spherical array of radiation detectors surrounding the subject's head. A computer program converts the photon emission pattern recorded by the detector array into a two-dimensional image of the cerebral activity pattern. This method of recording and computerized interpretation of the data is called tomography. Both tomographic methods can provide images of brain structure as well as of brain function, and both represent a milestone in the history of neuropsychology because they can be performed on awake human subjects without requiring any surgical interventions. Their advent was presumably one of the main reasons why former President George Bush declared the years 1990-2000 as the "Decade of the Brain."

The principle of the PET method is the detection of the emission of two gamma ray photons travelling in opposite directions upon the encounter and mutual annihilation of a positron (emitted upon the decay of a radioisotope) and an ordinary (negatively charged) electron. The gamma ray photons emitted are recorded by the array of radiation detectors surrounding the subject's head. This method of photon detection permits a fairly precise localization of the site of gamma ray emission, and hence of the source of the emitted positrons, with a spatial resolution of about 4 to 8 mm.

To perform a PET scan, the subject is injected with deoxyglucose labeled with an unstable (radioactive) isotope of fluorine, which emits a positron upon its decay. Deoxyglucose is an analogue of glucose, the main source of energy fueling the operation of the brain. Deoxyglucose, which lacks one of the five hydroxyl groups of ordinary glucose, is taken up but not metabolized by the cerebral nerve cells. Consequently,

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the higher the rate of activity of a cerebral nerve cell, the higher the rate of its accumulation of deoxyglucose, and of its radioactive fluorine level. PET scanning allows the monitoring of the biochemical function of localized cerebral ensembles of nerve cells during perception, movement, and thought.

The main drawback of the PET scan method is its high cost. The unstable fluorine isotope is produced artificially in an atomic accelerator by smashing an extra proton into the nucleus of a stable oxygen isotope. The artificially created fluorine nucleus is unstable, and regains stability upon converting its extra proton into a neutron by emission of a positron. The unstable artificial fluorine isotope has a half-life of only an hour, and thus has to be produced in a cyclotron and then incorporated immediately into deoxyglucose, virtually next door to the site where the PET scanning is to be undertaken.

The principle of the fMRI tomography method is that upon exposure of atoms with an odd numbered atomic weight (such as hydrogen) to a strong magnetic field, their nuclei behave as spinning tops and align their spin axes along the direction of the applied magnetic field. This alignment of the spin axes can be perturbed by a brief pulse of radio waves. The waves tip the spinning nuclei away from their parallel orientation, causing them to take on gyroscope-like movements. When the radio wave pulse is terminated, the nuclei tend to return to their original orientation, and in so doing, turn into little radio stations, emitting photons whose radio wave frequencies are characteristic of their species, as well as of their chemical and physical environments. As in the case of the gamma ray photons emitted in the PET scan procedure, the radio wave photons emitted in the fMRI scan procedure are recorded by an array of radiation detectors surrounding the subject's head during the experiment.

The pattern of fMRI signals abstracted by the tomographic analysis then provides spatially fine-grained information about the brain tissue scanned. For instance, an fMR image can discriminate between normal tissues of various compositions, such as the gray matter of the brain (i.e., the cell bodies of the cerebral neurons) and its white matter (i.e., the axons and dendrites of the cerebral neurons). It can also reveal abnormal pathological structures and processes, as well as the local level of electric activity of neural tissue.

Thanks to the development of these novel imaging methods, analysts of brain function can now localize lesions of the brain with much greater accuracy and without invasive procedures that interfere with brain function or endanger the subject's life. Moreover, investigators of

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mental processes can now observe the functioning of the living brain while their subjects think, perceive, and initiate voluntary actions.

I once saw the taped records of an experiment in which a professional pianist wearing a helmet containing the tomographic array of radiation detectors for fMRI scanning was asked to listen to a piece of piano music with which he was not familiar. Next, he was asked to listen to that same piece for a second time, but now to try to remember it well enough so that he would be able to transcribe it note by note. As it turned out, the tomographic fMRI patterns recorded from the subject's brain during the first and second session were significantly different, even though the sensory input to his auditory system was exactly the same in both sessions. What was different was the subject's mental state.

So it doesn't seem out of the question that one of these days cleverly designed comparative applications of these novel brain-imaging methods to blindsighted and normally sighted subjects might reveal the NCC at last.

Richard Grimm: I think you have sounded a good cautionary note that despite Moore's Law, and although research is obviously moving forward in important scientific areas, not all scientific and technological issues are linked to progress in terms of something on the order of Moore's Law. But now, we'll turn to Guy Burgess.

Guy Burgess: Predicting the future of anything, including technology, is a risky business. In the first place, there is chaos—the tendency of simple and well-understood systems to become chaotically unpredictable when they interact with one another. At the National Center for Atmospheric Research in Boulder they have a marvelous exhibit which demonstrates this principle. They start with one of the most predictable machines—a pendulum. They then hang two more pendulums from a bar at the end of the pendulum, and the result is pure chaos, not predictability.

When you start trying to predict human systems, things get even more difficult because humans change their behavior based on their own predictions. I have a good story which illustrates this principle even though it might not be altogether true. Years ago, I knew an ace computer programmer. He and his colleague fed staggering amounts of data about the stock market into their computers. The computers then produced a series of equations which were able to predict the past behavior of the stock market with astonishing accuracy. While my friend thought that this was scientifically amusing, his colleague thought that it was a way to get rich. When he used the program to play the stock market, however, he lost. Part of the reason was that his computer skills weren't all that

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exceptional. The big institutional investors were using the same new forecasting technologies to predict the market. And, when their computers told them that they were about to lose money, they changed their behavior. In other words the predictions were actually changing the system.

Human decision-making is a process of changing behavior based upon predictions. If people don't like the predictions, they change their behavior in ways which they think will produce a better future. This is a process which can kill promising, as well as undesirable, new technologies. The true thinking machines that we have been talking about might well go the way of nuclear power, the SST, and, perhaps, the increasingly controversial field of genetic engineering.

As a social scientist, my principal interest is in taming one of the most destructive forces on the planet—human conflict. When I think about the astonishing pace of technological progress (as evidenced by the preceding presentations) I am struck by the incredible mismatch between the rate of technological advance and social progress. Conflict problems which today threaten human welfare have changed remarkably little over the centuries. The tragic and destructive mistakes that lead to war and personal folly are repeated again and again. Proven strategies for reducing the destructiveness of these conflicts are often not implemented, leaving the parties to relive a predictable and tragic chain of events. My interest in rapidly expanding computing and communication technologies focuses upon their ability to limit destructive conflict and not their ability to produce dazzling new technological gadgets. I'm also not very interested in developing new forms of intelligence. I'd like to do a better job perfecting the one form of intelligence that we already have.

The inventions that I think might really do this surround the Internet and the World Wide Web. These inventions are changing the structure of the human knowledge base as profoundly as Gutenberg's Bible and the printing press. In my work we've found that the Web is reducing the cost of printing and distributing specialized information by roughly a factor of ten thousand, with similar increases in the speed of distribution. This is an enormous change. Four orders of magnitude is comparable to the difference between conventional and nuclear weapons, or the difference between walking and traveling by space shuttle. Quantitative change on this scale produces enormous qualitative change.

Gutenberg's printing press transformed civilization by dramatically lowering the costs of books and thereby providing far more people with access to them. Previously, books had to be hand-copied, which made them extremely expensive and rare. By making expanded literacy possible, Gutenberg dramatically increased the number of people who could

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utilize and contribute to the human knowledge base—paving the way for huge technological gains and the rise of modern civilization. Still, the potential of the printing press was not realized overnight. It took centuries for its impact to take effect, and even now, five hundred years later, illiteracy is still widespread.

Today computers and the Web are creating a parallel revolution. Only this time, things are moving much more quickly—even by the accelerated standard of twentieth-century innovation. When people talk of "Web years" it is a concept that really means something. It's not just hype. Still, this is a revolution that will take time. People have to develop the skills needed to take advantage of technological opportunities. Among other things, this will require people to learn to read and write in hypertext—the language of the Internet. Soon it will require audio and video producers to learn hypertext as well. This means that people will need to learn to write materials which do not have traditional beginnings or endings. What's more, they will need to write materials which will be read, watched, and listened to in different ways by different people.

As I indicated, my focus has been on using technology to make conflict processes more constructive. While many people assume conflict is bad, and that conflict resolution processes are needed to make conflict go away, I take a different view. I see conflict as the primary engine of social learning. Conflicts begin when one person says to another, "The world would be a much better place if you'd change." Conflict arises when the second person, believing that things are just fine, refuses. Decision-making and dispute resolution processes are the mechanisms that society uses to determine who prevails. Unfortunately, these processes are often very destructive, producing processes and decisions that are unwise, inefficient, unfair, or even deadly. My goal has been to help people identify and implement steps for limiting these problems and increase conflict's learning potential.

While I don't pretend to be able to agreeably resolve all conflicts, my field does offer a variety of powerful options for dealing more constructively with common conflict problems. Unfortunately, it is difficult to get these ideas to the people who need them. In the first place, conflict resolution is a field where the traditional, technical-expert model of information is inadequate. In this model, which is typical of medicine and engineering, "basic" scientific research leads to "applied" research which, in turn, leads to a tightly defined series of procedures which are taught to expert practitioners in professional schools. These practitioners ultimately sell their services to businesses, government agencies, and everyday citizens who never need to really understand what is being done on their behalf or why.

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While this expert-oriented model can be applied to the training of mediators and other professional intermediaries, it doesn't really penetrate to the level of grassroots disputing behavior. The reason is that conflict is fundamentally a do-it-yourself rather than an expert-driven process. Professional intermediaries are so expensive, and in such short supply, that they can facilitate only a tiny fraction of conflict interactions. Therefore, most conflicts are handled exclusively by the disputing parties and their friends and associates—bystanders who are frequently drawn into informal intermediary roles. Professional intermediaries are usually only brought in after conflicts deteriorate to damaging levels. Thus, if we want to really do something about conflict, we have to find ways of better reaching grassroots citizens with improved strategies for dealing with conflict.

To reach the average person, we have to first recognize that most of the time people feel little need for expert advice. Virtually everyone encounters conflict situations on a daily basis, and, as a result, they develop and gain confidence in their personal conflict styles. This means opportunities for learning tend to arise only when people are confronted with new and difficult conflict problems which they do not feel prepared to handle. In these situations, short windows of opportunity are created. Since people usually have to commit themselves to specific courses of action within days (or hours) of being presented with a problem, they are likely to revert to business-as-usual behavior—unless they can quickly, easily, and inexpensively find credible information about better alternatives.

Traditional education and training programs are generally unable to operate within this window. Typical three-hour college courses or forty-hour professional training programs tend to be offered at irregular times and in inconvenient places. These general courses, which try to address everyone's needs, are also unlikely to focus on a person's immediate problem. In addition, traditional programs tend to be expensive and time-consuming. People are commonly asked to spend hundreds of dollars and are required to take several days away from home and work. They are also likely to be so over-committed that they don't have the time to learn how to solve someone else's problems—they barely have time to look for better ways of dealing with their own. Traditional training programs also tend to provide participants with information on just one approach—even though there are many approaches available, each suited to a different situation. In a limited training program or class, there isn't time to compare and contrast the many available alternatives.

What we're excited about is that the Web, at least theoretically, offers a mechanism for getting around each of these limitations. First of all, it is possible to use the Web to provide users with free and instantaneous

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access to an extensive series of mini-lessons outlining common conflict problems and alternative strategies for dealing with those problems.

Still, successful efforts to exploit the power of the Internet require a recognition of its shortcomings. While the Web is capable of delivering written documents and, soon, audio and video clips at astonishing speed, automated systems for determining what exact piece of information to deliver are still woefully inadequate, at least in specialized fields like conflict. The Web's search engines are pretty good at finding information that is, at a superficial level, on a topic. The same search engines, however, tend to be unable to find quality information specifically focused on user interests. For example, a recent search yielded an article that was clearly on a topic. The only problem was that it was written by a kindergartner.

We see no alternative to the employment of old-fashioned editors—experts in the field who can review available Web-based and print-based information and determine what materials best address areas of likely user interest. Editors are also needed who represent a full range of perspectives on conflict problems. Without such editorial assistance, Web-based information technologies would be unable to direct people to useful information while also avoiding information overload.

People skilled in writing for the Web are also needed. It is not enough to deliver original source materials to users. Ideas must be presented using a style and vocabulary that users find comfortable. For example, many of the conflict resolution field's most useful insights are only available in the inscrutable lingo of highly specialized scholars. People who don't understand the jargon will simply miss the ideas. Similarly, ideas must be offered using examples which fall within the user's base of experience. When an idea is described in the context of one type of problem, people will find it difficult to see how it might be applied in another context. For example, one of the field's most important ideas, dispute systems design, was originally described in the context of labor/management conflict. When presented in this form, people are likely to have difficulty seeing how the ideas could be adapted to other situations such as parent/teacher conflicts. Still, the ideas apply equally well here—they just need to be translated into easily-understood language and illustrated with familiar problems such as conflicts over class sizes, student placement, homework loads, extra-curricular activities, etc.

Web-based resource and training programs can also be constructed, offering users a wide range of options for dealing with conflict problems along with an extensive discussion of the advantages and disadvantages

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of each option. It is, for example, possible to construct parallel lessons which show how mediation, arbitration, or litigation can be used to handle the same dispute. Users could then decide which approach they find most attractive. Programs can also offer in-depth lessons on sub-issues of likely interest—strategies for dealing with anger, technical uncertainty, or racial tensions, for example.

By conducting Web-based training programs with national or international audiences, it is possible to assemble groups of people who are interested in working together on highly specialized issues which are directly applicable to their immediate needs. People who are encountering a problem this week can find peers to talk to who have worked through the same problem last week. The increasing availability of virtually no-cost, Internet-based, long distance telephone service will also do much to unite these widely separated students into a true learning community. Local face-to-face programs could never realistically expect to assemble groups of people with such an immediate interest in a specialized conflict topic.

Thus far, at least for our field, the Web has been a relatively passive medium in which brochures and working papers are presented in difficult-to-read, on-screen formats. But more interactive materials are possible. Computer game manufacturers have clearly demonstrated that computers can provide an enormously interactive and engrossing experience. Simcity 3000, for example, is probably teaching kids more about the way that cities work than their high school or college teachers (unless, hopefully, they specialize in urban planning). Strategy games are also long-time big sellers, and managing is about strategy as much as anything else. It should be possible to build fascinating games in which people can match their skills with history's great peacemakers—trying to figure out how they would resolve international crises or long-term, intractable conflicts.

It may also be possible to develop much less expensive Web-based negotiation and mediation mechanisms capable of helping people deal with minor disputes which were previously beyond the reach of mediation services. This is still a controversial issue and it's not yet clear whether we might be able to replace mediation's human touch. But preliminary experiments at on-line mediation seem promising.

In traditional technical fields, the ultimate source of knowledge is basic and applied scientific research. There are also relatively clear research protocols which are widely accepted as methods for finding the "correct" answer. In a field like conflict resolution, the nature of knowledge is more complex and ambiguous. Many of the field's most

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important insights stem from long social and cultural traditions rather than scientific research. Personal experience also plays a much more important role. Conflict situations are so chaotic and complex that there are no generally accepted procedures for determining what works and doesn't work and why. This means that any comprehensive information system must deal with differing user images of what constitutes reliable information. Web-based programs, because they can draw upon the field's entire knowledge base, are able to offer users options tailored to a variety of social and cultural orientations.

Another big advantage the Web has over conventional training programs is its confidentiality. Understandably, people find it difficult to tell their boss that they don't know how to do their job and that they need one thousand dollars and a week off in order to learn it. The Web offers people an opportunity to advance their skills discretely and come to the boss with great new ideas which can help the organization better deal with conflict problems, while also advancing their careers and reputations.

There is another aspect of the Web which is largely positive, even though it may actually increase the number and severity of conflicts. This arises from the Internet's ability to help widely dispersed interest groups effectively organize themselves in ways which only wealthy user groups used to be able to afford. This is an empowering effect which is enabling previously disenfranchised groups to represent their interests more effectively in the public policy arena.

There are also future revolutionary changes in the pipeline. One for which I've been waiting for a long time is the development of affordable and highly portable computer displays and Web browsers that can be read as easily as old-fashioned paper. Such a display would be cheap, tough, light, and small (about the size and weight of a hardcover book). It would have just a few buttons and a high quality, easy-to-read screen. You would be able to put it on the kitchen table like a newspaper or read it as you ride to work on the subway or cuddle up with it in your favorite easy chair. Such displays will, for the first time, make computer-based hypertext able to compete with everyday, print-based media.

A second, perhaps more important innovation will be the addition of audio and video clips to Web TV. This will permit purposeful and productive channel flipping. It will also require the development of hypertext-oriented audio and video materials which parallel the text-based materials described earlier.

Still, one of the biggest problems with the Internet is that it is the best vanity publishing system imaginable. For a couple of bucks you can put an article up on the Web and, with a little luck, the search engines will

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feature your work as prominently as articles from the most prestigious research universities. This is why the Internet has, if you can find it, information on any conceivable topic. This also means that people no longer have to go to the trouble of wading through traditional sources of information—which are time-consuming, expensive, and often harder to use. Since people tend to be both over-committed and lazy, they tend to rely more and more on the Web as their primary research tool. The result is that easy-to-get, bad information is increasingly driving out hard-to-get, good information. This is especially true for today's students. Give them a research assignment and they will search the Web where they will find something on the topic, something that they'll decide is good enough. They won't go to the library or the bookstore, and they won't spend money. If there is a better source of information, they won't find it. The problem is, of course, that the information they find may be second-rate or, often, outright wrong. As the truly readable Web terminals that I described earlier become widely available, this problem is likely to spread to electronic books, newspapers, and other forms of information.

This leads me to suggest the existence of a Dismal Theorem of the Internet. If low quality, easy-to-get information really does drive out high quality, hard-to-get information, then the net effect of the Internet revolution will be a reduction rather than an expansion of the level of knowledge. The challenge, of course, is for universities, businesses, the media, philanthropic foundations, and the government to disprove this theorem by making sure that easy-to-get, engrossing, and high-quality information finds its way to prominence on the Web.

Audience Member: Where is your Web site?

Guy Burgess: We have built an initial prototype for the United States Institute of Peace available at http://www.colorado.edu/conflict/peace. Under a grant from the William and Flora Hewlett Foundation we have also just begun to work on a much more ambitious project CRInfo: the Conflict Resolution Information Source, which can be found at http://www.crinfo.org/. This is a comprehensive effort to strengthen the conflict resolution field's information infrastructure in ways which develop many of the ideas that I have described. Ours is an interdisciplinary field, and lots of people who are working in it know very little about what other wings of the field are doing. There are, for example, mediators, psychologists, and lawyers who never really talk to one

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another. We hope that the Web will be able to bring them together as more of a community.

Cynthia Colin: I was struck by what sounds very much as if you were bringing excited neuronal states into equilibrium, just as Ray was talking about, and using a quasi-neuronal network to do it. It seems to me you are talking about a kind of implementation of his learning robots, but not cellular ones.

Guy Burgess: It's almost a network. Instead of thinking at the level of neurons, you are thinking on the level of people and of historical ideas. The goal is to strengthen the human community across both time and space.

Cynthia Colin: You said that the laws of certain kinds of sciences will be the same tomorrow as they are today. I had thought the whole of Heisenberg's idea was that in fact they are not—that as you examine something, it does in fact change.

Guy Burgess: Parametric change goes beyond Heisenberg's style of uncertainty. With Heisenberg, the basic parameters of the system are known along with the probabilities associated with each possible state of the system. With parametric change, the system itself changes, making probability estimates inaccurate. My hard-science friends have always been uncomfortable with notions of parametric change, randomness, and unpredictability because it means that there are things that they can never know. Curiously, the notion of chaos is something that is more acceptable. And, there certainly is a lot of chaos and irreducible uncertainty in the hard sciences, especially as you get into the "real world" and opposed to experimental sciences.

Cynthia Colin: I also had a question for Gunther Stent. When you talked about "V1," were you talking about an illusion of unconscious, or a barrier to the expression of unconsciousness?

Gunther Stent: I was talking about two cerebral pathways from the thalamus to the parietal lobe along which the visual input is processed. One is the conscious "seeing system" that is routed via the primary visual area V1, and which has to be intact for awareness of the visual image. The other is the subliminal "on-line system" that bypasses visual area V1 and which continues to process visual input even if area V1 is

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damaged. Under these conditions, however, the visual image remains subliminal, i.e., does not reach the level of consciousness.

Cynthia Colin: Is that what happens when a person is put under general anesthesia?

Gunther Stent: The parts of the nervous system that are being turned off under general anesthesia correspond to what Francis Crick calls "the neural correlates of consciousness." Presumably they are turned off automatically during deep sleep, when we are not aware of our sensations.

Cynthia Colin: I don't think that's what an anesthetist would tell you he was doing.

Gunther Stent: Why not? According to Damasio's triple-decker sandwich theory of consciousness, general anesthesia would be induced by pharmacological blockage of the function of the core self. Anesthesia is interesting, of course, from a medical point of view, but I don't think it tells you too much about consciousness. It's too global a phenomenon.

Elizabeth Hansen: About two years ago, there was an article in *Annual Reviews in Anthropology* about the origins of language in the human species. Its leading hypothesis cited was that as human beings became erect bipedal walkers, there were temperature control problems. They were standing up, their heads were in the sun, and this led to the selection of bulging skulls. I thought that this was a very peculiar hypothesis, and I just put it in the back of my mind. Now, what you said today made me think about the redundancy of the human brain, and perception itself was going on anyway. If the perception bypassed V1, and went to the parietal lobe, and the muscle was able to recognize what had happened, then consciousness and articulation of consciousness seem to be very close together. So, what does that do for animals that don't have verbal communication?

Gunther Stent: I did not mean to say that language is necessary for consciousness. What I hope I did say was that consciousness is necessary for language. There used to be some psychologists who claimed that the possession of language is a necessary condition for conscious experience. But this claim is not likely to be true, in view of the behavior of apes that have no language but give every sign of being conscious. Some paleoanthropologists hold on anatomical grounds that Neanderthals

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couldn't have had a spoken language. If that claim turns out to be true, it would follow that language is not even required for the kind of human inner life that is the wellspring of art, in view of the recent discovery in Neanderthal burial sites in Slavonia of what appear to be authentic flutes fashioned from hollow animal bones. So it would turn out that the development of instrumental music (not merely song) preceded that of human speech.

Mark Mirsky: One of the problems with consciousness, and this is my experience both as an actor and just in general as a learner, is that there seems to be a disjunction between what you have identified as consciousness in the sense of this room of virtual reality in the brain where we assemble an awareness of our consciousness, and consciousness that somehow comes almost without our knowing how it comes. Anybody who has ever driven a car knows what I am talking about. The transition hour of learning how to drive a car without being really aware of how you drive it is a very dangerous period. We all have this double consciousness of learning through a direct pathway, but we don't pay full attention until we have formally learned or "assembled" what we know. When I was in high school, I felt I had a very poor memory. But when acting, I could master my lines very quickly, and as long as I was performing nightly, I could return them—but not in the way that one holds on to the text when paying attention.

Gunther Stent: As defined by Damasio, the concept of the autobiographical self seems to imply that one cannot be anybody but oneself. This rule can't be universal, however, because on stage great actors have to become someone other than themselves, i.e., manage to escape from their autobiographical selves. That's why Clark Gable or John Wayne or Charles Boyer weren't great actors. Maybe they weren't even actors at all, since they seemed to be unable to dissociate themselves from their autobiographical selves. No matter in what role they were cast, they were always the self-same Clark, John, or Charles.

Mark Mirsky: A question to Guy Burgess. I think one of the problems with the Web is the organization of material. One of my friends, a mathematician, had me sign up for several sites so that I would filter all this information and tell him what was worth paying attention to. There is an enormous amount of information on the Web, but you waste time wading through unnecessary and trivial information. So it is important that you figure out ahead of time what you have to read. I believe you

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are underestimating the effect of the Web on information, which still comes to us through the printed word, or the word that we recognize and then perhaps print out. Through the ring of associations one gets to very sophisticated information rather quickly.

Cynthia Colin: There is a very important project now, which identifies the lead articles which must be read by psychiatrists on interactions between oncology, drugs, and psychiatric drugs. People are identifying the five "must-read" articles, the five "next if you have time" articles, and the five "don't bother" articles. This is being done internationally and interlinguistically. It's another way of cutting through this thicket of journal articles that are out there. And it's all done on the Web.

Guy Burgess: *There are some things the Web does, and other things it* doesn't do. Automated systems which try to do it all basically don't work very well. Most of our money is going into editors. The mechanical part of getting all the page links wired up is pretty minor. It's the editors who count. As I mentioned before, I have a friend whose son needed to do a paper on some exotic tree frog. He researched on the Web, and got a paper on the tree frog. It was even written in language that kids could understand. However, it was written by a kindergartner.

One of the problems that we have in conflict resolution is that it is very hard for people to see how somebody else sees a conflict. They almost need to step into a different consciousness just to have a sense of where people are coming from. People tend to assume that those who disagree with them are doing so for evil motives, when they may just be coming to a decision that would seem reasonable if it were understood. There are whole series of interventions designed to help people to understand why they believe what they believe, and why others who disagree with them may not be as evil as they appear (though they may, of course, still merit opposition). Some of these dialogues involve, for example, discussions between right-to-life and pro-choice groups. One of the things that they do is to have a party where they get to talk with each other for an evening. They also have a bunch of little exercises designed to get acquainted. The only rule is that you can't talk about your views on abortion. So everybody gets to know each other as people before they find out about their fundamental disagreements. While this doesn't resolve the dispute, it does a lot to make it more constructive.

Edith Kurzweil: I don't want to change the subject, but I want to comment on something which I have been thinking about ever since Gunther

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Stent started to speak about consciousness and unconsciousness: it's fashionable now not to think of the unconscious in the same way that it was understood for many years—the way Freud had defined it.

Gunther Stent: By "unconscious" do you mean the "subconscious"?

Edith Kurzweil: No, Freud preferred not to call it "subconscious," which is a much more popular notion. You talked about the subconscious. But I am thinking of the fact that there now is a kind of cultural prohibition to consider the unconscious as psychoanalysts do. I am sorry that the psychoanalyst Yale Kramer, who was here earlier, had to leave. But I am sort of surprised that there is no thought given to it, since Freud was trying to resolve conflicts within the individual, and then—whether we thought it simplistic or not—applied it to groups. Since that's not a popular notion, I'm wondering whether this change of focus is coming from the culture, or from now available biological explanations and drugs, and so on? Are we confusing things just at the point where, as Freud expected and hoped, we would learn to understand the unconscious with the help of biology?

Gunther Stent: I think that "unconscious" is not a good term to use in the context of our discussion about consciousness. For me at least, "unconscious" is related to anesthesia, whereas the psychoanalytical subconscious seems more closely related to subliminal blindsight, under which somebody can actually identify the spatial location of an object without being aware of seeing it. The blindsighted are not unconscious. They just can't see, but otherwise they are fully alert. I think it's confusing to use the same term for the state created by general anesthesia, which just knocks one out totally, and for the Freudian notion of actively suppressing, i.e., refusing, to recall some specific memory of your autobiographical self. If Freud appreciated the difference in meaning between "unconscious" and "subconscious," he should have used a different word.

Edith Kurzweil: Maybe he should have, but he didn't.

Gunther Stent: Maybe that's why he has gotten into so much posthumous trouble lately.

Guy Burgess: The consciousness stuff also applies to social conflict. People have many different images of an issue. There are different

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pathways through a person's image of the world that lead to very different conclusions. Sometimes this can be manipulated by propaganda. Here the goal is to find the perfect sound bite — one that will yield the proper thought process and opinion. A lot of this is unconscious.

Years ago we wrote a book called *Justice Without Violence*. It was written on the premise that you couldn't expect people to give up the option of violent revolution in cases of extreme injustice, like apartheid in South Africa, without offering them some alternative, non-violent, Gandhian strategy for addressing injustice. It was a classic rational model which one of our advisors challenged. Violence and war are often irrational. You need to understand the emotional part of consciousness.

Richard Grimm: I think we are drawing to the end of our allotted time. I just want to ask Gunther Stent whether he has a response to the very optimistic prediction of Ray Kurzweil that within the coming decades we will come rather close to having a fully working model of the human brain in a sort of a hard-wired version.

Gunther Stent: I think it is very unlikely that — God forbid! — Ray Kurzweil's prediction will materialize, precisely because I am an *optimist*.

Richard Grimm: What are the problems with his predictions?

Gunther Stent: The paramount problem is the complexity of the brain. Ray Kurzweil seems to believe that if he collects enough data about neurotransmitter concentrations and electrical activity in the brain and feeds the whole shebang to a computer, the software will figure it all out. I don't think that this is in the cards.

Mark Mirsky: Gunther Stent, you spoke about the actor. One of the interesting things about being an actor is that part of the brain you refer to as the autobiographical memory. I am now speaking as a novelist who has been influenced by Robert Musil's work, particularly *The Man Without Qualities*. One thing that Musil qualified for me is how many people we have locked in our heads; and then in that autobiographical area, we don't necessarily have one autobiography. That is part of the complexity of trying to reconstitute the human brain. Just in terms of sight, we have many, possibly infinite, numbers of people and personalities which complicates the whole question of consciousness.

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Gunther Stent: I agree that there may be many potentially different autobiographical selves within each of us, and that normal persons try to suppress their internal *Doppelgänger* and work hard at becoming just one person. When you go to acting school, do they teach you to unlearn this, to extend your dramatic range?

Mark Mirsky: Yes. Every intellectual unlearns this as well and should be defying the notion of becoming one person. Flexibility, the ability to identify with many different people, is what makes you a really interesting thinking person.

Richard Grimm: Well, this sounds like an interesting subject for our next program, and I would like to thank the speakers, Professors Gunther Stent and Guy Burgess, and the audience for contributing to a valuable program.

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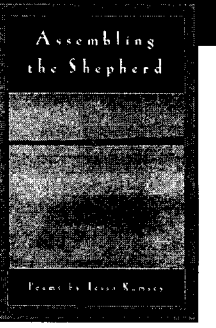

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ANNIE COHEN-SOLAL

"Claude L. Strauss" in the United States

> 'We can't have you use the name Lévi-Strauss. Here, your name shall be Claude L. Strauss.' I asked why and they said, 'The students would find it funny, because of the blue jeans.' And so I lived in the U.S. for many years with a mutilated surname.
>
> Claude Lévi-Strauss, *De près et de loin*

MANY YEARS BEFORE the "mutilation" of his name, Claude Lévi-Strauss had encountered the United States by reading American social scientists. Unlike most of the other students at the École Normale Supérieure, his intellectual interests moved outside his French environment. His concern in ethnology was largely due to his discovery of Robert Lowie's *Traité de sociologie primitive*. As a young *agrégé* in philosophy he wanted to become an ethnologist. He was, in his own words, "fascinated by exotic curiosities." A self-described joker, sneak, and collector, he haunted the Paris flea market on Saturday mornings and enjoyed Sunday "expeditions" to the French countryside.

Lévi-Strauss had been attracted to Lowie because he was both "theorist [and] field researcher." Between the two World Wars, social studies in France were severely hampered by lack of funds and organization, and were lagging behind social studies in countries like Germany and the United States. One prominent French sociologist openly deplored "the pitiful state of the teaching of social sciences in France." Philosophy was the supreme tool of access to knowledge, even as intellectuals who had emigrated from other European countries were beginning to create a "porous frontier" between the different fields within traditional social studies—philosophy, sociology, ethnology, and psychoanalysis. Under the influence of Marcel Mauss, a great theorizer who had little field experience, ethnology was slowly establishing itself as a distinct discipline.

Under the circumstances, Claude Lévi-Strauss's decision to move away from philosophy and embrace a related, yet nascent, discipline

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was bold. Even Paul Nizan, who had first introduced him to ethnology, had not dared such a move. As early as 1933, at the age of twenty-five, Lévi-Strauss had already chosen to abandon the tradition of Comte and Durkheim to pursue a new science that would legitimize his fieldwork and enable him to put it in a theoretical framework.

Equipped with this singular intellectual cast of mind, he sailed to Brazil in 1935 and "discovered the New World." When his first article on the Bororos was published in the *Journal de la société des Américanistes*, he would, unknowingly, attract the attention of American ethnologists—the very same ones who, a few years back, had attracted him to ethnology in the first place. This time, however, *he* was showing *them* the way. "They had begun to think that they knew enough about the Indians of North America and were looking towards the southern hemisphere. My work was coming at the right time," notes Lévi-Strauss. Indeed, Alfred Métraux and Robert Lowie were reading and taking interest in his work.

This intellectual encounter coincided with the irruption of the Second World War. In occupied France, the law of October 3, 1940 on the status of Jews excluded them from public office. Lévi-Strauss was stripped of his position as research professor at the École Normale Supérieure. Consequently, Métraux and Lowie invited him to the United States as a participant in the Rockefeller Foundation program established to save European Jewish intellectuals.

Lévi-Strauss accepted the invitation. His sojourn in the United States was to last six years, from 1941 to 1947. His experiences there proved extraordinarily diverse. "For someone who was eager for an intellectual quest," he wrote later, "a little bit of culture and intuition were all that was necessary to open, within the walls of industrialized civilization, doors that would lead to other worlds and other times." In the United States he was a little like Alice, pushing through each new door to find a New World. His adventures took the form of a play that had five distinctive acts.

Act I: Lévi-Strauss Encounters American Ethnologists

At the New School for Social Research, Lévi-Strauss was asked to teach a sociology class on contemporary Latin America in English—a subject about which he said he "knew nothing at all." His character was immediately put to the test. A practical man, he tutored himself as best he could from the available resources. At the Forty-second Street branch of the New York Public Library, he discovered "a considerable

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collection" in the relevant area and worked tirelessly on Peru and Argentina. "Everything I know about ethnology, I learned there," he admitted later.

Confronted by professional demands usually imposed only on established figures, Lévi-Strauss accelerated his research. In the Library of Congress and in the American Philosophical Society he found vast, unsuspected resources—"sleeping treasures," as he called them. Later, with the creation within the New School of the "French University in Exile"—which included figures like Georges Gurvitch, Jacques Soustelle, and Jean Weiller—Lévi-Strauss helped establish the Institute of Sociology. There he was able to teach in French and choose the topic of his class in ethnology.

The war proved something of a godsend for Lévi-Strauss because it catapulted him early in his career into intellectual hyperspace—from the poverty of French social sciences into the opulence of the American scientific community. There he had the opportunity to interact freely with acclaimed academics, unhindered by hierarchical barriers. In those days of exceptional intellectual activity, he was quickly and warmly welcomed by the master of American ethnology, Franz Boas, and admitted to a circle which included Robert Lowie, Ruth Benedict, Margaret Mead, and Ralph Linton.

During those years, certain elements in the American intellectual world that had attracted him almost intuitively in his early reading of Lowie's work became available to Lévi-Strauss: "In the U.S., I started to read periodicals like *Scientific American*, *Science*, and *Nature*," he declares today. "I didn't understand everything, far from it, but they made a valuable contribution to my work. . . .I have always been fascinated by traditional natural sciences like zoology, botany, and geology." Between the vast libraries and the numerous publications, Lévi-Strauss was discovering little by little the range of the American scientific community. The balance between arcane scientific research and its communication to a popular audience struck him as completely novel.

Another American novelty Lévi-Strauss discovered was that the borders between disciplines seemed more distinctive and yet less rigid than in France. He was able to inquire into the outer limits of ethnology and its relationship to other scientific disciplines, such as linguistics, psychology, history, mathematics, biology, and geology. He could also engage in dialogues with many others thus constructing a vast new scientific culture. As to history, he was "shocked by Malinowsky's positions as well as by those of a few American anthropologists." His own position was uncompromising. When he participated in the conference

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of American anthropologists in 1952, he deliberately provoked them: "I said that we were the scrapmongers of history and that we were scavenging for material from the trash cans of history." It was during that same time that he began a long friendship with Margaret Mead.

Act II: Encounter with Jakobson, Linguistics, and Structuralism

In 1942 Lévi-Strauss, who today likes to call himself the "Monsieur Jourdain of Structuralism," opened yet another door. "In those days," he admits, "I knew almost nothing about linguistics and had never heard of Jakobson." Indeed, he met with Jakobson in hopes of learning more about the linguistics of the languages he had encountered in Brazil. That meeting was far more important than he had expected. Beyond Jakobson's "amazing oratory gifts," Lévi-Strauss was presented with the true "revelation of structural linguistics."

This encounter had an enormous impact on Lévi-Strauss and offered him an essential key to his research. Jakobson began working on an "attempt to build a series of apparently arbitrary facts into a system." While listening to the great linguist, Lévi-Strauss was discovering that ethnology of the nineteenth century or even that of the twentieth century had been content, much like the neo-grammarians' linguistics, "to substitute problems of a purely causal nature with problems of means and ends. Structuralism was to reveal the *unvarying* through variety."

During those years, Jakobson had become a guide and master to the "naive structuralist." In his lectures, the Russian linguist had offered "novel insights" which came ever closer to Lévi-Strauss's "own conclusions," though the younger man did not yet have the audacity or the conceptual tools necessary to shape them. Their fraternity turned into intellectual complicity and a dialogue followed. As had happened with Lowie and Métraux, the work of the disciple caught the "master's" interest: Jakobson attended Lévi-Strauss's lectures on *systems of kinship*, suggested that he publish them, and encouraged what would soon become *Les structures élémentaires de la parenté*.

Act III: Friendship with the Surrealists

"Claude Lévi-Strauss was extremely kind and exquisitely polite. . . . He spoke little, but when he did he was precise, witty, deadpan, and sometimes even icy. He was above all a remarkable observer. He knew André Breton because they had crossed the Atlantic on the same ship. Both were extremely well-mannered, very courteous, and shared a similar

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type of education. They could understand and respect each other," stated Dolorès Vanetti, a friend of the New York circle of surrealists who worked with them in the Office of War Information. She said the two men came from the same intellectual tradition, shared the same tastes, the same passion for Gustave Moreau, Symbolism and neo-Symbolism, and had the same interests in the irrational. As Lévi-Strauss tells us: "I use roughly the same materials [as Breton] in order to attempt to analyze them."

United by a genuine "passion for objects," Dolorès Vanetti, Claude Lévi-Strauss, Max Ernst, André Breton, and others often visited a small antique shop on Third Avenue that sold wonderful exotic objects from the Pacific Northwest, a few of which, recalls Lévi-Strauss, "gave the impression that all the essentials of humanity's artistic treasures could be found in New York, where samples were constantly bought and sold." The artistic community in exile in New York included Duchamp, Masson, Tanguy, Matta, and Calder. It was a congenial group where one could find "a sense. . .of intellectual excitement," a group in which Lévi-Strauss was very comfortable.

Lévi-Strauss had immediately become close friends with Max Ernst. Indeed, it was more than a friendship; it was almost osmosis. He said that the surrealists had "taught him not to be afraid of abrupt and unexpected confrontations, the kind that Max Ernst had created in his collages." Later on, the ethnologist readily conceded that he had been inspired by the artist in his work on mythology: like putting together a collage, he would assemble "the myths as if they had been images cut out of an old book." "The structuralist method," he added in 1983, had "an affinity with the formula outlined by Max Ernst in 1934."

Act IV: Discovery of the Poetics of the City

UNDOUBTEDLY, ALL OF LÉVI-STRAUSS'S ENCOUNTERS could take place harmoniously because he had created a special language out of "his" New York. The city upset his expectations, caught him off guard, and deeply moved him. He had expected an "ultramodern metropolis," but found an "aggregation of villages," and "a huge vertical and horizontal mess." Allowing himself to be carried along by its movements, contrasts, and ebbs and flows, he observed the juxtapositions of the city, from the "syndicalist" atmosphere of Greenwich Village where he lived, to the "New York aristocracy" of the Upper East Side. He loved "the incredibly complex image of modern lifestyles next to almost archaic ones," exemplified by "an Indian wearing feathered headgear and a

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pearl-embroidered leather coat. . .taking notes with a Parker pen in the New York Public Library." He was able to capture with rare insight the peculiar behaviors of New Yorkers such as the "brisk changes in habits of dressing," women's customs ("In New York, women don't wear dresses, they wear costumes"), and the whims of a few of his colleagues who lived the "illusion of the pilgrim's life" in their country homes. He noted with humor the "deep mysteries of a subway express" with its "elliptical. . .signposts," and was able to see the paradox of American museums, at once fabulously rich and desperately poor.

In later years, remembering his New York days, he was grateful for the unlimited opportunities to conduct theoretical research. But he regretted having become a "member of the establishment." Yet in contrast to his own judgment, the observations he brought back show that the eye of the ethnologist remained as focused as ever—that New York had become his field of investigation, his gold mine.

In later writings, ranging from minute observations to comparisons with Europe, one can sense the extraordinary wealth of perceptions he gathered, as well as the diversity of the city's expressions he was able to capture. "There I was with an image of France before the war and I kept telling myself that none of this would be possible in France, and when I came back to France, I quickly began to notice the things that were arriving, . . .such as ads for personal deodorants, which I had found so offensive. When I came back, toward the end of 1947, they were there already."

Act V: A Stint in Public Service

IN *TRISTES TROPIQUES*, Lévi-Strauss criticized the "role of intellectual courtesan which France was gradually slipping into." He spoke from experience. After the war, he had been entrusted with an interesting mission—to succeed the archeologist Henry Seyrig as head of the Cultural Services of the French Embassy in the United States. To complete his work on family structures he needed to have access to American libraries and insisted on being sent back to New York. Louis Joxe, of the French Ministry of Foreign Affairs, agreed to forget that he would be a "part-time cultural counselor" and allowed him to continue his research at the Public Library.

The first of his official duties would be architectural in nature: the offices of the French Cultural Services had to be moved back into the private mansion that the French government had purchased before the war on Fifth Avenue at Seventy-fourth Street.

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> The previous proprietor of the mansion had been the owner of the National City Bank. We had found a large vault which I had asked a team of ex-convicts to break into: it contained all sorts of silverware, precious metals, even gold. . . . There was also a large reception room, or rather a large ballroom, with a painted ceiling and intricate woodwork, copied from a Roman palazzo. I asked Le Corbusier what to do with it. He answered, 'Don't touch it, it's a fine piece of craftsmanship, let's respect that.' Since then, each time I've moved into a new house with an old room or a weird kitchen, I have kept it.

Among the political decisions Lévi-Strauss had to make during those years were the bridges he helped build between French and American social sciences. Given the pitiful state of social sciences in France before the war, Lévi-Strauss set out to restructure this field by arranging high-level meetings between French academics and the Rockefeller Foundation. Throughout 1946 and 1947, a number of exchanges took place between Pierre Auger, the head of French Universities, Charles Morazé, the secretary of the International Committee of Historical Sciences, and several officers of the Rockefeller Foundation, to work on the development of the social sciences in France. "In France. . .J. H. Willits, the president of the Rockefeller Foundation, declared the problems to be huge." Indeed, the Americans were convinced that France was "the European country with the greatest opportunities for the Rockefeller Foundation's work." Toward the end of 1949, the Foundation had voted to grant the École Pratique des Hautes Études thirty thousand dollars for three years to establish a department of "social and economic sciences." Through this grant, economics broke away from the law faculty, and sociology and history were no longer buried in the humanities. The grant gathered together what would become France's first team of young researchers in the social sciences.

While Lévi-Strauss continued to take advantage of the opportunities offered by the city, he was also expected to entertain a variety of distinguished visitors such as Roger Caillois, Albert Camus, le Cardinal Tisserand, and Jules Romains. "All these people felt compelled, out of courtesy, to pay me a visit," he recalls with a smile. But he disliked the many administrative tensions and political skirmishes that eventually led him to resign:

> There were difficulties between the cultural services of the embassy, and Ambassador Bonnet and especially his wife. Unlike them, I was

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> working on a grand scale in a magnificent setting and in what amounted to a virtual Embassy of my own. My deputy was Anne Minor, a lawyer who had sought refuge in the United States. She worked tirelessly to ease those tensions. I tried hard to stay above the fray, and was a poor cultural counselor, as little involved as possible. Finally, there was an incident with General de Bénouville. After that, I told myself that I was ill-suited for this kind of business. I had just finished writing *Les structures élémentaires de la parenté*, and returned to France.

Other French intellectuals of Lévi-Strauss's generation had a variety of experiences during the war—participation in the Résistance, exile, deportation, death. Nizan and Cavaillès were dead. Desanti and Merleau-Ponty had moved to the unoccupied zone and fought in the Résistance; Raymond Aron had gone to London. His six years in the United States had set Lévi-Strauss apart. Armed with a very diverse and innovative intellectual perspective, he came back to the French social sciences to note an even wider gap between France and the United States. Its education, organization, resources, and men were all dilapidated. Even the Durkheimian school of sociology had been decapitated. The old generation was gone.

Whatever intellectual baggage Lévi-Strauss had acquired in the United States could never have been acquired without the war. As it was, few would have been able to take advantage of this extraordinary situation. Lévi-Strauss's intellectual character, much like his origins in the intellectual bourgeoisie, was curious, flexible, and versatile. He had both a solid understanding of his French identity and an incredible receptivity for everything new. By surrendering to the city's organic maelstrom and achieving symbiosis with its urban chaos, he had been professor, researcher, cultural administrator, anthropologist, and collector; and he thrived on the many bridges that linked worlds as yet unconnected in France. New York had offered him a wealth of experiences and encounters and had opened up a range of possibilities.

Was it easy for Lévi-Strauss to come back to France with this American model in mind, at a time when the majority of French intellectuals' sympathies were with the communists and stubbornly resisted everything American? Was it comfortable to be an unconventional intellectual, too idealistic for Americans, too innovative for the French, too literary for some and too erudite for others? In Paris, after the interest for structuralism had passed, he had to face its adversaries. He stated: "Educated people in France have bulimia; they have gobbled up structuralism. This rejection of structuralism was accompanied by a return

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the more traditional forms of philosophy." In the United States, when criticized by some American ethnologists for his "idealism," his "mentalism," or what they called the "Lévi-Straussian *truths*," he would defend his work tirelessly, recalling his respect for investigative research, observation, and ethnographic inquiries, stressing the rigor of his "inductive approach" and his "patient investigations." He rejected accusations of "playing with abstract concepts disconnected from reality. . .and of following paths unfairly mistaken as being hyperintellectual." Why did he defend himself with such ardor? Could it be that he now wanted to prove that the French philosopher in him was dead?

The cross-fertilization which the American foundation fostered between American and French social sciences was largely due to the efforts of Lévi-Strauss—who also became one of its many beneficiaries. He had come back to France at the right time, when this collaboration had just begun. In the years that followed, he earned the highest accolades of French academia: he became lecturer at the École des Hautes Études, secretary general of the International Council of Social Sciences at UNESCO, professor at the Collège de France; he founded the Laboratory of Social Anthropology, and was eventually elected to the Académie Française. By 1960, Lévi-Strauss had become the undisputed master of French ethnology. He founded *L'Homme*, a publication modeled after the *American Anthropologist*, and had become one of the few French social scientists with a universal reach. Who else could have ventured into such daring territories as comparing Bergson's work with Sartre's, and meditating on metaphysics by the standards of Sioux Indians?

Had the man who returned to France in December of 1947 opened "every door giving way to other worlds and to all times"? In any event, he re-entered the French intellectual world a changed man. He felt "deep gratitude toward the United States" for "the helping hand" which had "saved his life," and the "intellectual environment and resources" that had been made available to him. He returned with a strong feeling of indebtedness. In spite of the exceptional offers which would later come from many universities, including Harvard, he chose to remain in France, happy to "renew his small bohemian existence, preferring his Saturday morning visits to the flea market to the charms of Cambridge, Massachusetts," and recovering the mutilated part of his name, to again become Claude Lévi-Strauss. Later, he would write, "I knew that every fiber in me belonged to the Old World, forever."

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STEPHEN MILLER

Henry Adams: The Confusions of Cosmic Pessimism

In 1907 Henry James and Henry Adams both published books that were in part meditations on the American future. Adams's *The Education of Henry Adams* was privately printed and offered only to friends; James's *The American Scene* was based on the "gathered impressions" of a ten-month trip he made to the United States in 1904 after a twenty-year absence. It is often wrongly assumed that James and Adams, who were friends, had the same dark view of the American future. Many of James's remarks about the United States are negative, but the impressions of a "restless analyst," as James called himself, have little in common with the grandiose pseudo-scientific theories of the deeply pessimistic Adams.

Adams's and James's books have one thing in common; both addressed a question that we continue to wrestle with: the effect of immigration on American democracy. Many observers thought the new immigrants posed a threat to the health of American democracy. In *The American Commonwealth* (1888), James Bryce said that the immigrants "follow blindly leaders of their own race, are not moved by discussion, [and] exercise no judgment of their own." Adams was more pessimistic than Bryce, though not solely because of immigration. In 1906, when he was writing *The Education*, he told a friend that "our whole system, social, political, and moral, is so rotten that a good strong push will upset it all."

Thirty years earlier Adams had not been such a pessimist. Moving to Washington in 1877 with his wife, Marian "Clover" Hooper Adams, Adams hoped to play a behind-the-scenes role in reforming American democracy. "The fact is," he wrote in 1877, "I gravitate to a capital by a primary law of nature. This is the only place in America where society amuses me, or where life offers variety. Here, too, I can fancy that we are of use in the world, for we distinctly occupy niches which ought to be filled. . . .I belong to the class of people who have great faith in this country."

In his witty novel, *Democracy* (1880), and in his two-volume *History of the United States of America During the Administrations of Thomas*

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Jefferson and James Madison (1889-90), Adams basically kept that faith. Though he looked down on party politics, he believed in political reform and scientific progress. In *Democracy* the narrator says that "underneath the scum floating on the surface of politics, Madeleine [the novel's protagonist] felt there was a sort of healthy current of honest principle." In the *History*, Adams argues that scientific and technological progress is more likely to occur in America than in Europe because of the absence of class barriers. "The average American," he says, "was more intelligent than the average European, and was becoming every year still more active-minded."

When James was in Washington in January 1882, he enjoyed attending Adams's salon and admired their efforts to reform American politics. In "Pandora" (1884), James offers a genial portrait of Henry and Clover Adams, whom he calls Mr. and Mrs. Alfred Bonnycastle. Count Vogelstein—the German diplomat who serves as James's point of view in the story—notes that Mrs. Bonnycastle's husband "was not in politics, though politics were much in him; but the couple had taken upon themselves the responsibilities of an active patriotism."

On December 6, 1885, Clover Adams committed suicide. After learning about her death, James remarked: "What an end to that intensely lively Washington *salon*." It was also the end of Adams's role as a reformer. He soon turned into a prophet of doom who liked to tell his friends that he had "died to the world." In 1902 he wrote that "I have long ago looked on my own life as quite finished," and in 1906 he took great pleasure in the fact that the *New York Times* had referred to him as "the late Henry Adams." He also claimed to be uninterested in politics. "Politically I am extinct. Domestic reform drivels. Reformers are always bores."

Despite this remark, Adams remained interested in politics, for he filled his letters with political and economic commentary that was colored by his pessimism about the course of Western civilization. In 1893 he told his friend John Hay that "I am pretty mad about it [the current economic crisis]. In fact, I am furious, and in no frame of mind to be judicial or historical. I am intensely curious, too, for I think we may be on the verge of a general collapse of the social fabric in Europe." The United States, he said, was also in bad shape; "my dear democracy is all in pieces."

In the 1890s, Adams thought the main force wrecking Western civilization was what he called "gold-bug" capitalism. The chief agents of this destructive capitalism, he said, were Jews. (Adams had not always attacked Jews; in the *History* he berated Jefferson for a scornful reference

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to Jews.) He called the major financial centers—Lombard Street, Wall Street, State Street—"Juden-gassen," and he told Hay that the "Jew question is really the most serious of our problems. It is capitalist methods run to their logical result." Hay found Adams's obsession with Jews tiresome; he joked that Adams even blamed natural disasters on the machinations of Jews.

According to Adams, Jews were more than financiers who held the levers of financial and political power; they were a demonic, destructive force. In *The Education* he speaks of Heinrich Heine's "derisive Jew laughter," and in his letters he speaks of "infernal Jewry." His anti-Semitism probably reached a fever pitch during the Dreyfus Affair. He applauded the prosecution of Dreyfus because it was stoking the fires of anti-Semitism. The Dreyfus Affair "has resulted in enormously stimulating the anti-Semite feeling in France. . . .The current of opinion is running tremendously strong, now that the whole extent of the Jew scandal is realised."

In the 1900s, Adams's interest in Jews abated somewhat—not because he was less anti-Semitic but because he decided that the main reason Western civilization was heading toward collapse was the power of new technologies that man could not control. If in the *History* Adams argued that scientific and technological progress was for the most part a positive force, he now argued that it was a negative force. In 1892 he told Brooks Adams, his equally pessimistic younger brother, "I apprehend for the next hundred years an ultimate, colossal, cosmic collapse; but not on any of our old lines. My belief is that science is to wreck us, and that we are like monkeys monkeying with a loaded shell." Science and technology had created forces that man would not be able to control. In 1906, he asked a friend: "What is the end of doubling up our steam and electric power every five years to infinity if we don't increase thought-power? . . .Our power is always running ahead of our mind."

Although Adams attacked scientific and technological progress because he thought its ultimate effect was destructive, he also hoped to make use of science to plot the course of history. In "The Tendency of History," an address given in absentia to the American Historical Association in 1895, he said that it was wrong to assume that scientific theory supported progress. A science of history could no longer expect to take "the form of cheerful optimism which gave Darwin's conclusions the charm of a possible human perfectability." A science of history would have to fix "with mathematical certainty the path which human society has got to follow." Adams at times implied that such a scientific project was essential in order to prevent the collapse of civilization, but for the most part he suggested that nothing could be done to prevent this collapse.

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Adams's friends found his cosmic pessimism irritating. Adams "could be delightful" as a companion on a walk, Oliver Wendell Holmes Jr. said, "but when I called at his house and he was posing to himself as the old cardinal he would turn everything to dust and ashes." Adams's older brother, Charles Francis Adams, Jr., complained that his two younger brothers—Henry and Brooks—drove him "nearly wild by talking through their hats on things in general." James, who did not see Adams again until 1891, also disliked Adams's pessimism. "I like him," James said, "but suffer from his monotonous disappointed pessimism."

Adams, though, apparently enjoyed James's company, but he wasn't interested in James's novels. In 1878 he wrote his close friend Charles Milnes Gaskell: "I am glad you liked Harry James. He has many good points. I never read my friends' books so that I may express no opinions about them." Adams did read *Daisy Miller*, which he liked, but he was most affected by *William Wetmore Story and His Friends* (1903)—a biography that James dashed off in two months to fulfill an obligation. The book is less a biography of Story, who was a dilettante expatriate sculptor whom James held in low esteem, than a series of "recollections," as James puts it, of the Rome in which Story lived (and James often visited) and the Boston of Story's, James's, and Adams's youth.

Writing to James about the book, Adams throws in a dash of cosmic pessimism that is hard to decipher: "We have reached a time of solar antiquity when nothing matters, but still we feel what used to be called the law of gravitation, mass, or attraction, and obey it." In the next paragraph he says something startling: James's book is his book. "Verily I believe I wrote it. Except your specialty of style, it is me." Adams's point, which he explains in the next paragraph, is that James's "recollection" is Adams's own story and the story of their generation: "Harvard College and Unitarianism kept us all shallow. We knew nothing—no! but really nothing! of the world. One cannot exaggerate the profundity of ignorance of Story in becoming a sculptor, or Sumner in becoming a statesman, or Emerson in becoming a philosopher." After mentioning several other names, Adams drives home his point by saying: "So you have written not Story's life, but your own and mine,—pure autobiography,—the more keen for what is beneath, implied, intelligible, only to me, and half a dozen other people still living. . . .You treat us gently and kindly, like a surgeon, and I feel your knife in my ribs."

James didn't think he was a failure, and he didn't think Boston had failed him in the sense that Adams had suggested. He told Adams that Story's life pushed him "to conclusions less grim, as I may call them, than in your case." He also said that all biographies tend to make a

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diminished thing of the life being recounted. "The truth is that any retraced story of bourgeois lives. . .throws a chill upon the scene, the time, the subject, the small mapped-out facts. . . .The art of the biographer—devilish art!—is somehow practically *thinning*. It simplifies even while seeking to enrich. . . .The proof is that I wanted to invest dear old Boston with a mellow, a golden glow—and that for those who know, like yourself, I only make it bleak—and weak!" James clearly disagrees with Adams's view of "dear old Boston," but he tactfully says that it is the distortions of biography that account for Adams's negative view of their common past.

In many respects, *The Education* is an elaboration of the main point of Adams's letter to James, which is that "we knew nothing." In a letter to a friend, Adams suggests that the book is a call for educational reform: "Please try. . .to think of it [*The Education*] as what it was written for—a serious effort to reform American education by showing what it ought to be." This remark makes little sense, for the main point of *The Education* is that reform—educational reform, immigration reform, political reform—is pointless. "Above all, it [the scientific view of history] was profoundly unmoral, and tended to discourage effort." According to Adams, science—or more specifically the kinetic theory of gas—predicted the acceleration of history. "Therefore, dispute was idle, discussion was futile, and silence, next to good-temper, was the mark of sense. If the acceleration, measured by the development and economy of forces, were to continue at its rate since 1890, the mathematician of 1950 should be able to plot the past and future orbit of the human race as accurately as that of the November meteoroids." There was nothing to do but "wait the end." Or try, as Adams did, to plot the grim future.

In a sense, then, everyone is unfit for a future that promises doom, yet Adams says that his generation was more unfit than others to succeed in the new world of late nineteenth-century America. In the second paragraph of *The Education*, he claims that his chances of success are as poor as that of a Jew. "Had he been born in Jerusalem under the shadow of the Temple and circumcised in the Synagogue by his uncle the high priest, under the name of Israel Cohen, he would scarcely have been more distinctly branded, and not much more heavily handicapped in the races of the coming century, in running for such stakes as the century was to offer." Yet later in the book he strongly implies that the Jews are far more likely than he is to succeed. "His world was dead. Not a Polish Jew fresh from Warsaw or Cracow—not a furtive Yacoob or Ysaac still reeking of the Ghetto, snarling a weird Yiddish to the officers of the customs—but had a keener instinct, an intenser energy, and a surer

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hand than he—American of Americans, with Heaven knew how many Puritans and Patriots behind, an education that had cost a civil war. . . . Adams would have liked to help in building railways, but had no education. He was not fit."

What is Adams's point—that the Jews are more fit than he is because they were not educated the way he was? And if they are more fit, is that a good thing? Adams often seems to enjoy proclaiming himself unfit. The unfit, he implies, are morally scrupulous, whereas the fit—i.e., the Jews—have no scruples whatsoever. All they have is energy.

Adams insists that he was a failure, yet he was hardly a financial failure; he was a successful capitalist whose knowledge of stocks and bonds saved his family from financial ruin. It grated on Henry James that the independently wealthy Adams complained about being a failure. Adams, he says, was "what I should have liked to be—a man of wealth and leisure, able to satisfy all his curiosities, while I am a penniless toiler." Was Adams a political failure? He did not have a political career, but he never tried to have one because he disdained party politics. As Holmes shrewdly said: "If the country had put him on a pedestal, I think Henry Adams with his gifts could have rendered distinguished public service." Adams, Holmes said, "wanted it handed to him on a silver platter."

If it was humbug of Adams to call himself a failure, it was also odd to say that his entire generation was unfit. His older brother Charles was a successful businessman who became president of the Union Pacific Railroad. His friends included a successful scientist, painter, jurist, novelist, and philosopher, as well as several major politicians and statesmen: John Hay, Henry Cabot Lodge, and Theodore Roosevelt. Adams means they are unfit in one sense only; they do not share his cosmic pessimism.

Sometimes Adams seems to exult in his sense of failure and in his knowledge of the coming collapse. On a return from a trip to Europe in 1904, he describes how unfit he is for life in the 1900s.

> Prosperity never before imagined, power never yet wielded by man, speed never reached by anything but a meteor, had made the world irritable, nervous, querulous, unreasonable, and afraid. All New York was demanding new men, and all the new forces, condensed into corporations, were demanding a new type of man—a man with ten times the endurance, energy, will, and mind of the old type. . . .As one jolted over the pavements. . .the new man seemed

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> close at hand, for the old one had plainly reached the end of his strength, and his failure had become catastrophic.

But he knows something that the new man doesn't know: "The two-thousand-years failure of Christianity roared upward from Broadway, and no Constantine the Great was in sight."

Adams's pessimism—especially his attempt to use science to predict the future—did not sit well with William James, who told him: "I don't follow or share your way of conceiving the historical problem as the determination of a curve by points." James praised only the boyhood part of *The Education*. As for the rest, he offered Adams a dubious compliment: "There is a hodge-podge of world-fact, private fact, philosophy, irony, (with the word 'education' stirred in too much for my appreciation!) which gives a unique cachet to the thing, and gives a very pleasant *Gesammteindruck* of H.A.'s *Self*." William James strongly implies that *The Education* is incoherent.

Responding to William James's critique, Adams characteristically mocks his efforts: "I am the champion failer of all," he says, adding that the book is a failed "literary experiment" that should be thrown into the fire. In a subsequent letter to William James, he says that his book is "rotten" because his mind has gone to seed. "You do not reflect that I am seventy years old—yesterday,—and quite senile." Admitting that he "had a weakness for science mixed with metaphysics," Adams was very much aware that his voyages into strange seas of thought were regarded by many of his friends as foolish, so he often laced his abstruse scientific-historic speculations with self-mockery.

On May 6, 1908, Adams sent Henry James a copy of *The Education*, this time strongly implying that it is an autobiography, not a representative portrait of his generation. The volume, he says, "is a mere shield of protection in the grave. I advise you to take your own life in the same way, in order to prevent biographers from taking it in theirs." Two days later James thanked him profusely for the book, but he didn't comment on it until August 31, 1909—more than a year later. Praising the book as "admirable & intensely interesting," James apologized for not replying earlier. "I speak of the reasons for my ugly dumbness as many, but they really all come back to my having been left by you with the crushing consciousness of far too much to say. I lost myself in your ample pages as in a sea of memories & visions & associations—I dived deep, & I think I felt your extraordinary element." He continues in this fulsome vein for another two sentences—not saying anything specific

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about the book. James undoubtedly read the boyhood part, but one wonders if he read the rest.

Many of Adams's friends were not impressed by *The Education*. Senator Henry Cabot Lodge disliked the way Adams treated him; the medievalist Henry Osborn Taylor, who had been Adams's student at Harvard in the 1870s, wrote in his copy: "In this book the mind of Henry Adams rattles around the universe to little purpose." Charles W. Eliot, the President of Harvard, was reported to have said about Adams and his autobiography: "An overrated man and a much overrated book."

The verdict of posterity was far more favorable. *The Education* became a best-seller when it was published in 1918 (in 1916 Adams approved its publication after his death), and in 1919 it won a Pulitzer Prize. Reprinted many times thereafter, *The Education* has been regarded by many critics as one of the classics of American literature as well as a key modernist text. Recently, *The Education* was voted the best nonfiction book of the century by a panel of historians, scientists, and book critics. It influenced, among others, T. S. Eliot, who reviewed it favorably in 1919. The book was popular because its deep pessimism about the future of Western civilization struck a chord. World War I persuaded many people that Adams was right to have spoken of catastrophe and chaos, and he was right to have spoken of the illusions of turn-of-the-century America. "Few centres of great energy," Adams says in *The Education*, "lived in illusion more complete or archaic than Washington."

But Adams, as we have seen, had his own illusions about the power of Jews and about a science of history. Why did the supposed machinations of Jewish financiers loom so large in his mind if, as he says, "no one was to blame"? If anyone pressed him on his theories of doom, Adams always had an answer: self-mockery. It was his shield of protection—not only in his letters but in *The Education* itself. "Did he himself quite know what he meant? Certainly not!" Or: "He seemed to know nothing—to be groping in darkness—to be falling forever in space; and the worst depth consisted in the assurance, incredible as it seemed, that no one knew more."

Adams often defended himself by pleading ignorance and confusion. "No one means all he says, and yet very few say all they mean, for words are slippery and thought is viscous." This is a dodge, for Adams meant what he said about Jews and about a science of history; he was serious, his self-mockery notwithstanding. The self-mockery is a preventive defense; he calls himself a fool before anyone else does. It is also a dodge to say that "thought is viscous." There are degrees of viscosity. Adams's attempt to wring non-scientific meanings from scientific laws

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makes no sense whatsoever. Ernest Samuels, Adams's acute biographer, says about Adams's generalizations: "It is not a question of whether they are true or not, or even convenient as images, but whether they are fundamentally intelligible. In spite of the prodigious effort of thought Adams still could not. . .either state his problem or wholly know what he himself meant."

In the last decade of his life, Adams still tried to formulate a science of history and still remained obsessed with Jews. "The atmosphere really has become a Jew atmosphere," he wrote Gaskell in 1914. "We keep Jews far away, and the anti-Jew feeling is quite rabid." In 1914 Adams wrote Henry James a "melancholy outpouring," as James puts it, about James's *Notes of a Son and Brother* (1914). Adams's letter is lost, but it probably was similar to the letter he wrote to his friend Elizabeth Cameron: "I've read Henry James's last bundle of memories, which have reduced me to a dreary pulp. Why did we live? Was that all? Why was I not born in Central Africa and died young. Poor Henry James thinks it all real and actually still lives in that dreary, stuffy Newport and Cambridge with papa James and Charles Norton—and me!"

In his reply to Adams, James grants that there is an abyss between the present and the past, but he doesn't see why Adams thereby dismisses the past and turns away from the present as well. Adams, he implies, is mired in a sterile pessimism whereas he still takes an interest in things past as well as present. "I still find my consciousness interesting—under *cultivation* of the interest. . . .You see I still, in presence of life (or of what you deny to be such), have reactions—as many as possible—and the book I sent you is a proof of them." The generous and endlessly curious mind of James recoils at Adams's monotonous complacent pessimism.

Addicted to self-pity, obsessed with Jews, and preoccupied with wringing political and historical answers from science, Adams does not so much diagnose the twentieth century's diseases as suffer from them.

WE MOURN THE PASSING OF

ELLA WOLFE
1896-2000

A LONG-TERM SUPPORTER
AND A GOOD FRIEND

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SANFORD PINSKER

Henry Adams and Our New Century

> Among the thousand symbols of ultimate energy, the dynamo was not so human as some, but it was the most expressive.
>
> Henry Adams, *The Education of Henry Adams*

I WAS HARDLY SURPRISED when *The Education of Henry Adams*, surely one of the oddest and most important of American books, recently headed up the Modern Library series ranking of one hundred best works of English language non-fiction. Such lists seem quintessentially "American." Indeed, I can imagine many readers ticking off the books they've thumbed through, even as they make plans to browse around in the others. Much of what drives this essentially well-meaning effort is the guilt that has always been our country's blessing and curse. As a people, we like nothing more than to construct ambitious "to do" lists and then to take a measure of satisfaction as each chore is completed, or in the case at hand, as each book is dutifully read. Benjamin Franklin, singularly responsible for such civic improvements as fire companies, circulating libraries, lightning rods, and cobbled streets, is also the patron saint of list makers everywhere. Add the palpable fact that the grains of the twentieth century's hourglass quickly ran out and all the necessary conditions seemed right for separating what is worth preserving from the merely ephemeral. In looking back, we can see where we once were and why we ended the twentieth century as we have.

Thus, we have seen (and disagreed with) the American Film Institute's (AFI) list of the one hundred best American films and the even more controversial announcement by the editorial board of Modern Library series about the one hundred best English language novels. One can safely predict that there will be more such groupings as we speed through the year 2000. No doubt some organization will come up with a list of the one hundred most important American athletes, as others did with American musicians. Granted, such lists are consciously

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designed to be conversation-starters, and in the cases of the AFI and Random House, to generate publicity for their respective organizations. A case can be made for ignoring such obvious public relations stunts, but the fact is, we all rather enjoy perusing a list that includes the obvious, the outlandish, and the omitted.

Many pundits pointed out that the blue ribbon panel's first choice—James Joyce's *Ulysses* (1922)—may well have been a distinguished novel, but it is also one that few general readers, including themselves, had been able to slog their way through. By comparison, F. Scott Fitzgerald's *The Great Gatsby* (1925), the runner-up, emerged easily as nearly everyone's consensus favorite. After that, however, the ranks of dissenters swelled as some noticed that women writers seemed noticeably absent or that works written after 1965 got very short shrift.

Much the same scenario attaches itself to the more recent Modern Library series list of one hundred best English language non-fiction books. Few general readers, I suspect, have bothered to turn a single page of *The Education of Henry Adams*. For one thing, Adams, like Joyce, is a difficult read; for another, his book is not at all the tell-all, confessional outpouring that current readers of autobiographies expect. In short, Adams's tome, then and now, would hardly have made a good candidate for Oprah's Book Club. Whatever else *The Education* comes to it is *not* a survival memoir, which is to say, the story of somebody who escapes his or her probable fate. Quite to the contrary: Adams is as puzzled and as seemingly unprepared at the end of his long rumination as he was in its opening pages. Put even more bluntly: in Adams, one looks for happy endings in vain. And yet, hidden under layers of protective irony, self-deprecating humor, and a deep sense of cultural despair, is not only the complicated story of Adams's "miseducation" but also a prophetic rumination about where America was headed at the end of the nineteenth century.

In Chapter XXV ("The Dynamo and the Virgin"), the one chunk of Adams that undergraduates are likely to know from surveys in American literature, technology becomes the focus, indeed, the very definition, of American power. Its argument revolves around two tropes—the forty-foot dynamo that Adams watched with increasing fascination while he attended the Paris Exposition of 1900, and the Virgin, a force that, he argues, once unified twelfth and thirteenth century Europe, and that had created such majestic splendors as the cathedral at Chartres. For Adams, the Gallery of Machines not only summed up the Industrial Revolution in an oversized nutshell, but also pointed the way toward what he believed would be a disunified and dehumanizing twentieth century.

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One could, of course, argue that Adams worked from a limited sense of what made the year 1900 so important. His fixation on the dynamo speaks to a long obsession with the psychodynamics of force, but a case can be made for other ideas that would change life even more than the dynamo to which Adams ironically prayed. I am thinking, for example, of Max Planck's quantum physics and Sigmund Freud's *Interpretation of Dreams*—both of which burst upon a startled world in 1900. Adams might well have included them in his litany of things that his (mis) education, at Harvard and elsewhere, had not prepared him for; but the plain truth is that he allowed the dynamo to become a collective symbol for his nagging sense that the past was irretrievable, the present chaotic and confusing, and the future a cause for deep concern. Why so? Because just as the world of earlier schoolmasters had been turned upside down by the observations of Copernicus and Galileo, and later, by Columbus's explorations, so too had the dynamo confounded every organizing principle that Adams had searched for—presumably in vain.

Granted, Adams's persona was firmly wrapped in the mantle of failure—so much so that savvy readers soon suspected that he was protesting just a bit too much about his ignorance and ineptitude. Still, when he writes that "Nothing in education is so astonishing as the amount of ignorance it accumulates in the form of inert facts," we can, I think, take Adams at his word. "Inert facts," the material that one dutifully memorizes and then reproduces on exams, were essentially useless because they could not be actively applied to rapidly changing situations. Such "facts" simply sat there, rather like cornflakes in a bowl of milk, and became increasingly soggy. Here it is worth mentioning that Adams's proposed subtitle for *The Education* was "A Study of Twentieth-Century Multiplicity." If the Virgin harkened us back to a simpler age, one that organized and thus unified itself around the force of religion, science often seemed to dump the human component altogether, preferring the disinterestedness that is an essential component of the scientific method.

Adams had, in fact, explored the tensions between religion and science earlier—in a novel (*Esther*, 1884), and in *Mont-Saint-Michel* (privately printed in 1904), to which *The Education* is a sequel. What his ruminations point toward is nothing less than the rapid collapse of Western culture as science replaces religion and dehumanized people increasingly pray to machines rather than to God. Adams may not have been the "failure" he made himself out to be, but he was surely a sour, disappointed man. Part of the reason probably lies in the long shadow cast over his name by great-grandfather John Adams, second president of the United States, and grandfather John Quincy, our country's sixth

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president; another part is the unexpected suicide, in 1885, of his wife, Marian Hooper; and the final part has to do with the large intellectual ambitions of *The Education* itself. Not since the days when the Puritan mind of Jonathan Edwards tried to reconcile determinism with free will has there been such a dazzling display of intellectual sophistication as there is in Adams's *Education*. That the book concludes on a pessimistic note is hardly surprising, given his sense of the quickening pace that a technology-dominated society would exact on its citizens.

That was then, as they say, and this is now. One of my favorite writing assignments asks students to consider the following puzzler: "At the end of the nineteenth century Henry Adams fixed on the dynamo as the appropriate symbol/trope for the then new twentieth century. What do you imagine he might write with regard to the twenty-first century—that is, if he were still among us?" As you might imagine, responses ranged across a wide spectrum—from those who envisioned America as a utopian dream to those who figured that the planet wouldn't survive the next century. Most, however, argued that the thumbnail-sized computer chip would replace the world of forty-foot dynamos. No doubt Mark Twain's quip that nobody should be a pessimist before the age of forty, and that nobody should be an optimist thereafter, is part of the generational arithmetic (unconsciously) built into the assignment. Not surprisingly, I number myself among those who feel that our culture is speeding toward hell in the proverbial handbasket, but with these caveats: I do not imagine a golden age of television, or anything else; and I think that all the grim talk about an apocalyptic smash-up just around the corner is so much romanticism on the cheap.

What I am concerned about, however, is how the human spirit will fare in a world increasingly defined by the computer chip. This past winter, many people were worried about what would happen when the Y2K bug finally hit on January 1, 2000. Some had already established a foothold in the wilderness, laying up stores of dehydrated food, bottled water, and weapons. Others planned not to travel by airplane on that day, or on any that immediately followed. Still others figured that they'd just ride it out. After all, an event as hyped as Y2K usually turns out to be a disappointment, rather like the hurricane that does not hit or the much-ballyhooed Hollywood film that ends up a bust. What remains clear, at least at this post-Y2K point, is that the microchip remains ubiquitous: it browns our toast, turns our lights on and off, and is the guiding principle in our cars. No one can buy a house or deposit money in a bank without running into a computer chip somewhere along the line. Indeed, we are told, in terms that approach patriotic

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cant, that the computer is responsible for our nation's very strong economy and for the "smart bombs" (talk about a contradiction in terms!) that have turned us into (selective) policemen of the world. To imagine our computers "down" and dysfunctional reminds me of nothing so much as those ex-Marxists who contributed to a collection entitled *The God That Failed*. Is it possible, I wonder, that romancing the chip might lead to a similar despair?

"Not so," I can imagine many muttering. The computer chip has made much possible, but as they used to say in vaudeville, "you ain't seen nuthin' yet!" If a person is casting about for an equivalent to Adams's dynamo, he or she need go no further than the Internet, the most powerful source of information the world has come up with thus far. One would have to be a curmudgeon of the first rank to toss cold water at the oceans of material that can be called up by a simple double-click of the mouse. Fortunately, there are any number of such curmudgeons in the house, including some who put the kibosh on the Internet's ancestors. "I know too much already," detective maven Raymond Chandler once observed, and he went on to make this startling assertion: "I would be happier knowing less." Eyeballing these words, Joseph Epstein, a cultural scold of the first water, could hardly contain his enthusiastic agreement: "We read certain writers for those moments when they tell us what in our hearts we already know, but for one reason or another, haven't managed to formulate for ourselves. This was such a moment for me." It is also high praise of the sort that Epstein parcels out very sparingly.

At issue is information overload, a phenomenon that poor Chandler, pecking away on his typewriter, only felt in its intimations. He did not live long enough to see the full blossoming of search engines and databases. Nonetheless, even in his day people were drowning in too many books, too many magazines, too many claims on our limited time and attention spans. Rather like a person held captive at a party by a distraught friend all too willing to share the intimate details of his or her impending divorce, I often think that what the information highway most needs is a rest stop. Do I really need to pop into every chat room with available seating or check up on the latest tell-all book being peddled by Amazon.com? Whatever happened, I wonder, to the leisurely conversations of yesterday, the ones conducted everywhere from Greenwich Village espresso bars to old-fashioned suburban coffee klatches? Gone (some would say "sacrificed") into the mighty maw of the Internet. Today, urban coffee shops on the cutting edge boast that they are fully wired and that patrons can slurp down lattes as they surf the Net.

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What's wrong with this picture? Well, nothing if you happen to figure that human connections aren't worth a fig and that what matters is a blinking, never satisfied cursor. Adams rightly worried that the dynamo would lead to dehumanization, but even he wasn't prescient enough to realize how machine-like we would become. Here, one can distinguish between those in the 1930s, 1940s, and 1950s who took a certain pleasure in announcing that they were "alienated" and the way that subsequent generations passively accepted their dehumanized state. Let me be more specific about this. I have always been affected by a single line from Saul Bellow's first novel, *Dangling Man* (1944). Describing a typical Chicago landscape, his protagonist suddenly pulls away from his exercise in realism to ask the following question: "What in all this speaks for man?" One might argue, as several critics in fact have, that the central project in Bellow's work is the care and feeding of the soul. He uses this loaded word without apology or embarrassment, for it is the (often troubled) soul that makes us fully human. Is that enough to put Bellow in the same camp as the Mont-Saint-Michel-loving Adams? I suspect not, because Bellow has a grittier, more existential sense of what matters in our human contract, and because he is not likely to give himself over to the curious theology that pulses just beneath Adams's ruminations. Still, reverence of a sort factors in to what turned both men into important writers.

At this point, I find myself on the slippery slope that leads to gloomy thoughts those of a certain age call "the end of civilization as we have known it." Perhaps it is better, *wiser* if you will, to remember what Amory Blaine, the protagonist of F. Scott Fitzgerald's *This Side of Paradise* (1920), said about time in the newly forming modern world: "Modern life. . .no longer changes century by century, but year by year, ten times faster than it ever has before—populations doubling, civilizations unified more closely with other civilizations, economic independence, racial questions, and—we're dawdling along. My idea is that we've got to go very much faster." Granted, we do not continue to read Fitzgerald's novel for its penetrating analyses of socialism or its "ideas" in general, but rather for its uncanny way of putting a finger squarely on the pulse of modern times.

Whatever stability was associated with a generation of out-of-it Victorian parents had been forever shattered by the destabilizing effects of World War I. As such, Fitzgerald spoke for "a new generation. . .grown to find all Gods dead, all wars fought, all faiths in man shaken." To be sure, this is the stuff of which romantic postures were then constructed (Edmund Wilson, Fitzgerald's Princeton classmate, famously called

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them "gestures of an indefinite revolt"), but if Amory Blaine is dead wrong about nearly everything—and never more so than in his final line about "knowing himself"—he is dead right about the way that years in the modern world seem to race ahead more quickly than do centuries.

Adams understood that timelessness was inextricably connected with the Virgin's power and that the dynamo offered up quite another emblem of force—mechanistic and ultimately masculine. "An American Virgin," Adams proclaimed, without his usual self-deprecating ironies, "could never dare command; an American Venus would never dare exist." Adams felt this because, for better or worse, America retains elements of a Puritan sensibility, not only in its no-nonsense assumptions about "educational toys" (an oxymoron of the first water), but also in the heated debates that revolve around pornography. Here, the Monica Lewinsky affair can stand as Exhibit A. Pundits divided themselves between those who deplored the feeding frenzy that led to an impeachment hearing and those who gleefully participated in it. Roughly the same thing might be said of the American citizenry as a whole: even those who did not number themselves in Geraldo Rivera's nighttime TV audience could not escape the video footage of Ms. Lewinsky hugging a president who, later, denied categorically that he had ever had sex with "that woman, Ms. Lewinsky." At stake were the rights of privacy and the obligations of character, a sense that morality still mattered or that what consenting adults did was nobody else's business. That positions pro and con soon took on a heavy political coloration was as sad as it was predictable.

We are still reckoning the costs of this sordid, unseemly mess. Surely one of them will be the realization that there is often less than a dime's worth of difference between (formerly) responsible journalists and tabloid rumor-mongers. Another, potentially more serious result is that we will (at last) be forced to confront sexuality in ways that go well beyond the pragmatic lobbying of feminists or the juvenile attitudes of those males who associate fast cars with the female body. It is high time that, as a nation, we grew up—but that is not quite the same thing as saying I agree with those European journalists who pointed out that presidential mistresses are taken for granted in sophisticated countries such as France, Italy, and Greece. Only in America could there be such hand-wringing and finger-pointing about behavior that every schoolchild in Europe understands as commonplace.

Adams, I hasten to point out, took an entirely different tack on America's wide, prudish streak. It was, for him, evidence of a refusal to take

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the sheer power of sex into consideration, to transform it from inert idea to abiding presence:

> Adams [writing about himself in the third person] began to ponder, asking himself whether he knew of any American artist who had ever insisted on the power of sex, as every classic had always done; but he could think only of Walt Whitman; Bret Harte, as far as the magazines would let him venture; and one or two painters, for the flesh tones. All the rest had used sex for sentiment, never for force.

The dynamo was, thus, the perfect American symbol, a way of giving to force an inhuman, altogether mechanistic face. Its orgasms were belches of steam or smoke, wheels turning ever faster, and at the end what it produced in great abundance was the very power that an Industrial Revolution requires. As for history, it was, in the words of assembly line maven Henry Ford, so much "bunk," something that Europe had far too much of, and that America could do well enough without.

The coming attractions that the Internet promises are part of the same "faster is better" mentality that has always been our country's blessing and its curse. Computers, I am told, are out of date at approximately the same moment they leave their respective packing cartons. Indeed, one often gets the uneasy sense that bells-and-whistles currently on display are destined to be replaced, and in the blink of an eye, by even snazzier bells and whistles. What matters most, of course, is speed, a phenomenon that science writer James Gleick explores in his latest book entitled, appropriately enough, *Faster*. Gleick's book is a fountain of "factoids" out to make the point that our culture is moving along at warp speed. But from my vantage point on the far right lane, the *real race* seems to be between the various causes of heart-stopping stress and the pills one can pop to keep anxiety under control.

In *The Souls of Black Folk* (1903), W. E. B. Du Bois confidently asserts that "The problem of the twentieth century is the problem of the color line." His prophecy (sadly enough), turned out to be true, and, sadder still, some would argue that the problem Du Bois spoke about in the early years of his century will continue well into the next one, if not beyond it. But *a* problem, however (seemingly) intractable, is not the same thing as *the* problem; and it is here that I am forced to disagree not only with Du Bois, but also with Adams. Why so? Because there are any number of other, equally worthy candidates for the dubious honor of defining the twentieth century: totalitarianism, environmental suicide, the atomic bomb, gas chambers, and ethnic cleansing. Even this

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expanded list will surely not please everyone, nor was it meant to. My point is simply that things have grown too complicated for prophets of the Adams-Du Bois sort; and that this realization comes with the territory of our new century.

There was a time, Norman Podhoretz points out in the opening pages of *Making It* (1967), when sex was "the dirty little secret" of proper late-Victorians. The memorable phrase belongs to D. H. Lawrence, and small wonder that he came to feel it necessary to smash the artificial walls of social convention if candor were at last to speak. Adams suggests much the same thing when he takes American culture to task for its puritanical fear of sex and of the force that women represent in the potent emblem of the Virgin. Nowhere was this conflict between the Self and Society more pronounced than in the life-choking silence both writers felt had long surrounded sex. Lawrence's unflinching modernism was a recipe for what he regarded as a healthy sexual liberation.

In 1967, the year *Making It* was published, Podhoretz used the book to admit, or confess, that "success" was the dirty little secret of his day: on the face of it, nothing seems simpler than the notion that it would be better to be a success than a failure and better to be rich than to be poor. But at one time in the America of the last century, if you happened (or aspired) to be an intellectual or a writer, living above the poverty line was a sure-fire mark of the philistine, and too much success placed you squarely in the camp of the bourgeoisie.

Today most writers, with certain notable exceptions (one thinks of reclusives such as J. D. Salinger or Thomas Pynchon), grit their teeth and develop good manners when on a book tour, and most intellectuals are only too happy to chat about ideas on *Nightline* or *The Charlie Rose Show*. No doubt those who shake their heads at such behavior still regard SUCCESS as the "bitch goddess" William James thought it was, but they are in a tiny minority, one usually dismissed as green with jealousy.

Success, in short, is no longer the dirty little secret that Podhoretz once set out to expose. The question, then, is this: Is there another dirty little secret for our time? When a student put this poser before me—and smack in the middle of a class on *Making It*—I was rather taken aback. My first inclination (which I kept to myself as I pleaded for a professorial "extension") was to say "no"—because we are so awash in tell-all confessions, between hard covers and on daytime television, that I have a difficult time imagining if anything, anything at all, could now be considered "tasteless." Indeed, tastelessness threatens to become our taste. Henry David Thoreau once argued that the mass of people live "lives of

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quiet desperation." My hunch is that "quiet" will hardly do in a culture that grows ever-noisier about its complaints.

However, subsequent ponderings about our age's dirty little secret—or lack thereof—took me in a rather surprising direction. If the litmus test of a dirty little secret is that one is afraid to give public voice to private feeling, then it just may be that the dirty little secret of our time is that we miss God. *The Death of Satan* (1995), Andrew Delbanco's estimable study of how Evil no longer packs the power it once did, chronicles the decline and fall of Satan as a potent emblem of sinfulness. I would argue the other side of his coin by suggesting that missing God is a by-product of a culture that prefers to explain evil away rather than to confront it directly. For example, there are enough scholarly "explanations" of Hitler for journalist Ron Rosenbaum to write a thick book on the subject. Evidently, to know about Hitler's (abused) childhood is enough to excuse his adult behavior. Nor does the drift toward relativism end there: at the end of the day many trendy intellectuals are no longer able to distinguish good from evil, the noble from the base, or truth from falsehood. What matters much more, indeed, what will place you nicely on the cutting edge, is a conviction that authority of any sort must be deconstructed—including, of course, God's.

The dirty little secret, then, is that many intellectuals and writers know better, but are afraid to come clean—and small wonder because to speak about missing God is not only to risk being lumped with religious fundamentalists on the far right but also to earn the censure, if not the contempt, of those who roll their eyeballs whenever public intellectuals speak too glibly about God. After all, missing God implies that people once had a defining relationship with the Deity, and that the secular rhythms of the twentieth century have whittled it away. No one, including me, can "prove" that this is the case, but one has intimations, hunches, if you will, that much in our culture lacks a spiritual anchor. Such inchoate feelings fly in the face of those much longer certainties. They will tell you, for example, that our real problem has nothing to do with God and everything to do with replacing the old, bad social constructions with new and improved ones. The result is that those in the spiritually ambivalent middle learn to keep their silence in the face of everything that coarsens the cultural atmosphere and drastically lowers the human bar.

It would be easy, indeed, too easy, to end this piece, as Adams did his, on a sour note. Granted, prophets of doom have a way of being right while those who see a rosy future are usually wrong. But this is an occasion when the words of my grandfather seem particularly appropriate.

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He would ask me if I knew how to make God laugh. I would think about his strange question until my eight-year-old head hurt. But nothing came to mind. Satisfied that he had my attention, he unloaded the answer: "Tell Him your plans!" This struck him as very funny, although the eight-year-old me ended up just as perplexed as I had been before. Only much later did I realize that we live on one time continuum and God on another. A delayed reaction (in my case, some fifty years) is often the benchmark of the best Yiddish quips. Despite the brouhaha that turning the millennial calendar kicked up in the Christian (and, yes, non-Christian) world, my hunch is that life will go on pretty much as it has in the months and years before 2000. Granted, there will be new occasions for debate—about genetic engineering, the social consequences of people living well beyond one hundred, and the exploration of outer space—but it is also true that the fundamental questions of why and how we live, and why and how we suffer, will abide, just as the earth and the heavens abide.

For Adams, what mattered was the source of power. He could no more turn the clock back to ages that looked to the Virgin than he could stop the progress represented by the dynamo. We are, I suspect, in something of the same boat. Indeed, F. Scott Fitzgerald, to quote him once again, ended *The Great Gatsby* with an image of our collective American fate as boats beating against the current, "borne ceaselessly into the past." But will this trope prove true as we speed through the twenty-first century? I suspect not, even as I am sure that Americans will continue to wrestle with the purity of Gatsby's deluded dream so long as serious stories of our national consciousness survive. I say this because our new century is likely to be one in which power belongs to a new generation of dynamos—smaller, faster, and more efficient than Adams could envision. They will pump out information for the same reason that efforts to clone human beings will continue—namely, *because they can*. Social disapproval, even stringent laws, will prove no match for the curious scientist/technocrat working away in a secret laboratory. He or she will speak to the ahistorical values deeply imbedded in the American consciousness, where fully understanding the Virgin's force never had a chance. And as with much that we count as "progress," the capacity to create will be coupled with an equal ability to kill. If our last century was one of nightmare, it is possible that the new one will force us to reevaluate the term as a new landscape of nightmare emerges.

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TERRY TEACHOUT

Dance Chronicle: Going a Lot to the Mark Morris Dance Group

I FIRST SAW the Mark Morris Dance Group some eight years after its 1980 debut, by which time every important critic in America had had his or her say about the Bad Boy of Modern Dance. The level of disagreement was high enough to provoke the verbal equivalent of fistfights in print and in lobbies. Some thought Morris was God (or, as he puts it in his programs, god), while others were no less sure he was an overhyped fraud. Nobody appeared to think anything in between. The New York dance scene suffers chronically from this sort of polarization—it's called, appropriately enough, dance politics—but never in my then-brief life as a balletomane had I seen so deep a fissure of opinion.

Determined to make up my own mind, I went to the Brooklyn Academy of Music, where the company was dancing, if memory serves, "Sonata for Clarinet and Piano," "Fugue and Fantasy," and "Strict Songs." I had my doubts about some of what I saw that night. The range of body types on stage was diverse to the point of comedy—I'd never seen a plumpish dancer before, or a balding one—and the company's manner of moving struck me as puzzlingly loose-limbed. (Later that season, Mikhail Baryshnikov and American Ballet Theatre would premiere "Drink to Me Only With Thine Eyes," and I remember thinking how nice it would be if Morris's dancers looked like *that*.) I thought, too, that Morris was using camp as a way of concealing his emotions, and that there was something unconvincingly ostentatious about the same-sex partnering which at that time was something of a company trademark.

Yet for all my reservations, there was no question in my mind about Morris's singular talent. Even then, it was plain to see that he had the rare ability to fill a stage with eye-catching, music-driven movement. I also liked the fact that his pieces were impersonal and unsentimental—the opposite of everything I loathed about the lapel-grabbing school of modern dance drama that Martha Graham had mothered. By that time, I already suspected that Twyla Tharp would not fulfill her youthful promise, and no new choreographer of equal interest had come along since then, which explains why so many of Morris's early fans were

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inclined to fawn over him. Unlikely as it seemed, this long-haired loudmouth showed every sign of having the potential to become an artist worthy of comparison with the greatest dancemakers of the twentieth century, George Balanchine very much included.

From then on, I made a point of seeing the Mark Morris Dance Group whenever it came to New York. Unfortunately, there weren't all that many performances to see. The company soon moved to Brussels, and for the next few seasons its American appearances were infrequent. Even after Morris and his dancers returned to this country, they spent most of their time on the road, and their New York seasons tended to be short. In addition, they rarely performed older works—Morris preferred to show new dances—making it impossible to get to know their repertory more than superficially.

This lack of familiarity with Morris's work is a greater obstacle to comprehension than is commonly understood. Balanchine was once widely regarded as a "difficult" artist, even by ostensibly knowledgeable critics; not until New York City Ballet began giving extended seasons of repertory at City Center did it become possible for serious dancegoers to become comfortable with such bristlingly complex ballets as "Concerto Barocco" or "The Four Temperaments." Edward Gorey, for instance, attended each and every performance the company gave between 1957 and 1982, later writing a delightfully knowing book called *The Lavender Leotard; or, Going a Lot to the New York City Ballet*. I never went to City Ballet that often, even in my first hot flush of discovery, but within a few seasons I had gone often enough to see most of Balanchine's major ballets a half-dozen times or more, and the more I saw them, the more I saw in them. With Mark Morris, by contrast, what you saw the first time was what you got, and all you got.

By the mid-1990s, I was regularly covering Morris's New York openings, and my feelings about his work were more or less the same as they had been in 1988. Though he remained the only choreographer under the age of fifty who looked like a major artist in the making, some of his dances I thought successful, others less so, several not good at all, and none unequivocally great. As I wrote in a 1994 essay:

> Those who find Morris irritating also find it impossible to ignore him. I find him extremely irritating, and it would never occur to me to ignore him. There is no young choreographer I admire more. But, then, Morris isn't so young anymore. By the time he was 37, George Balanchine had made "Apollo" and "Serenade" and "Concerto Barocco." If the comparison seems unfair—these are, after all, three of the transcendent masterpieces of 20th-century dance—it is worth

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> remembering that we expect the most out of those we admire the most; they are the only ones who can disappoint us. It is not quite right to say that I have been disappointed by Morris's work to date. What I *have* been disappointed by is its constricted range of emotion, its not-infrequent failure to rise to the highest expressive implications of the music its maker loves so much and understands so well. "Interesting is easy, beautiful is difficult," Gustav Mahler said. I'm ready for Mark Morris to stop being interesting.

This essay was astonishingly presumptuous, given the fact that I had then seen no more than two dozen of Morris's dances, very few of them more than once. But at least I recognized his importance, and though some of his work continued to elude me—I must have been the only critic in America who was left cold by the evening-long *L'Allegro, il Penseroso ed il Moderato*, thought by many to be his masterpiece—I kept on looking, and thinking about what I saw.

With each passing season, I felt more in tune with what Morris was trying to do; I felt that he was deepening as an artist. For me, the turning point came in 1997 with "Rhymes With Silver," a forty-minute-long ensemble piece set to a new score by Lou Harrison. The balance between levity and seriousness seemed exactly right, especially in the central pas de deux, which I described in a review written the morning after the New York premiere:

> Kraig Patterson stands stock still while the choreographer flaps and flutters desperately around him. What does Morris want? Why won't Patterson acknowledge his presence? The questions are left wide open until the end, when Morris clutches his knees (significantly, a dancer's injury), sinks to the floor in apparent agony and crawls away. Then Patterson finally comes to life, walking slowly offstage behind Morris. It is an unforgettable climax to a remarkable dance.

Interestingly, Morris had long been reluctant to choreograph pas de deux. It was almost a matter of principle with him—he preferred ensembles or multiple duets—and I believed that this unwillingness to confront what has traditionally been the expressive focal point of theatrical dance was symbolic of what I still persisted in seeing as an inhibition on his part. Could it be that his sexuality was somehow interfering with his ability to get to the heart of the matter? It wasn't that he was embarrassed about being homosexual (to put it mildly); it was, rather, as if he found the very idea of love embarrassing. Conversely, I saw in "Rhymes With Silver" a new willingness to engage directly with human emotion, and praised it accordingly.

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Since then, I have continued to look at Morris's dances as often as I can. What has changed is that I have been able to see more of them, and to see some of them more than once. Two years ago, his staging of Henry Purcell's opera *Dido and Aeneas* was presented at the Brooklyn Academy of Music, where I had last seen it in 1989, and American Ballet Theatre finally revived "Drink to Me Only With Thine Eyes." Last winter, Morris's company premiered "The Argument," a powerful study of three splintered relationships set to Robert Schumann's Five Studies in Folk Style; it was repeated in the summer by Mikhail Baryshnikov's White Oak Dance Project in a slightly different version for a man and three women. In January, the company performed "The Argument" and four other pieces at the 499-seat New Victory Theater, and prior to that I had the opportunity to spend two weeks watching Morris and his dancers rehearsing in the studio.

Going a lot to the Mark Morris Dance Group has not inspired me to join the ranks of Morris's uncritical admirers, but it has caused me to suspect that when I found some of his earlier work unsatisfactory, the fault was not in the dances or the dancers, but in me. What I once felt to be a "loose, baggy quality" that sometimes came across as "sloppy and unfocused" now looks impeccably right (though I happily stand by my earlier comparison of his idiosyncratic movement vocabulary to "the weird draftsmanship of a Thurber cartoon"). Similarly, greater familiarity has bred keener appreciation of his uncanny musicality, not merely in the large-scale architecture of his dances but also in their point-to-point phrasing. And certain dances that I used to find naggingly campy—especially the party scene from *The Hard Nut*, Morris's comic-book version of *The Nutcracker*—now strike me as funny and touching, just as he meant them to be.

The greatest revelation came from seeing a rehearsal and two performances of "My Party," a fifteen-minute-long dance for four men and four women set to Jean Françaix's agreeably lightweight C Major String Trio. So far as I know, "My Party" is not generally thought to be a major work (it is mentioned only in passing in Joan Acocella's excellent biography of Morris), though the members of his company claim to love it. "That one always makes people cry," a dancer who took part in the 1984 premiere told me. I found it to be a miniature masterpiece, and one that also sheds light on certain aspects of Morris's style that I once found elusive.

To begin with, "My Party" is a pure ensemble work: all eight dancers are on stage throughout the piece, and they pair off without regard to gender. This, Acocella says, is "the message: no rules, free choice." But according to Morris, "My Party" is not a political statement, but a reminiscence of the parties he used to give as a teenager in Seattle in the early 1970s (the

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decor consists of a single strand of cheap Chinese lanterns), back in the days when he was spending much of his spare time dancing with a Balkan folk ensemble. "I fell in love with the group," he told Acocella. "I fell in love with several individuals in sequence, and they fell in love with each other."

Something not unlike this is essentially what happens in "My Party." While there is one show-stopping moment in the finale when the couples fall to the floor and start rutting—quite amiably, too—the emotional center of the dance is the slow movement, a sweet-and-sour song without words that a more conventional choreographer would have turned into a romantic duet. Instead, Morris's dancers form a circle and embark on a folk-like group dance that is at once austere and mysteriously tender. "Isn't it weird?" he says. "It's somehow become sad or poignant, or something. I've no idea how. It's plain. I like plain. And kind of naive." To my eyes, what results is not a sermon on sexual identity (Morris is not given to sermonizing in any case), but an oddly haunting evocation of the awkwardness and uncertainty of adolescence, in which uniformly glamorous bodies and a pas de deux, however beautiful, would have been out of place.

As I watched "My Party" at the New Victory, I recalled what I wrote after seeing *L'Allegro, il Penseroso ed il Moderato* for the first and, so far, the only time:

> For all its richness, there is a neat, once-over-lightly quality about *L'Allegro* that I find troubling. And Morris's lack of interest in partnering works against him here. To make a full-evening ballet without a single pas de deux is a mark of great ingenuity. . .that leaves a blank at the expressive heart of what ought to be a cathartic experience.

Perhaps I would feel the same way today. More likely, though, I was "seeing" *L'Allegro* through the distorting glass of convention, instead of looking at the dance itself, and I am now eager to give it—and myself—a second chance.

Not long ago, I told another of Morris's dancers that while I admired his work greatly, I had somehow failed to connect with *L'Allegro*. Instead of bristling, she smiled and replied, "You'll experience it fully in the future, never fear." Time was when *I* might have bristled at so confident a retort, but now I know better. Mark Morris may not be perfect, but he is definitely good enough to be given the benefit of the doubt, no matter what unlikely-looking thing he may choose to do next; whatever it is, I'll be there, the same way I'm there whenever Paul Taylor or Merce Cunningham make a new dance. Like them—and unlike anyone else—he is the real right thing.

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KAREN WILKIN

At the Galleries

If you avoided shows with "millennium" in the title, this winter's exhibitions offered welcome distraction from the hordes of holiday tourists, the weather, Y2K anxieties, and the year-end hoopla. For escape value and aesthetic pleasure, there was little to beat *Still Life is Still Alive* at Jan Krugier Gallery. These intimate images of a circumscribed tabletop world inspired fantasies about taking pictures home, although it might have proved impossible to choose between a delectable Pierre Bonnard, a muscular Max Beckmann, and a cool, assured Giorgio Morandi—not to mention the splendid Braques and Picassos or the unexpected Alberto Giacomettis and Joaquin Torres-Garcias. Among others. As we have come to expect of Krugier, the exhibition was a vivid reminder of what true connoisseurship is all about.

Farther uptown, at Hollis Taggart, *Alfred Maurer: Aestheticism to Modernism* afforded an opportunity to see a broad spectrum of work by this important but still underrated pioneer modernist (and occasioned the publication of a handsome, informative catalogue by the show's curator, Stacey Epstein). Maurer is, oddly, both well known and obscure. His place in the history of American art is acknowledged and a few significant exhibitions have been mounted by public and private galleries in Washington and New York over the past two decades or so, but we hard-core fans still await the definitive show—the one that will make everyone realize just how good Maurer is. The retrospective at Hollis Taggart, alas, while ambitious, wasn't it. While it covered Maurer's entire career and included some first-rate pictures, the selection seemed rather expedient and the installation, problematic. Paintings crowded every available wall of the gallery's townhouse, along staircases, over computer desks where staff were working, and in private offices, making it hard for the visitor to concentrate (or to avoid feeling like an intruder). It's evidence of the strength of Maurer's art that so many paintings withstood this chaotic presentation, most notably a selection of still lifes from the late 1920s, with their tipped tabletops and crisply overlapped, sharp-edged planes, and a group of figure paintings ranging from the elongated, quasi-expressionist women of the twenties

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to the strangely flattened, ambiguously sexed heads of the thirties. One of the latest and most compelling pictures in the show, (painted about a year before the painter committed suicide, in 1932 at age sixty-four) and certainly the oddest, was a conflation of human and feline heads that dissolved, as you watched, like a modernist Cheshire cat, into pure painting incidents, held together as much by the contrast between angular and curving gestures as by obvious pictorial logic; only the emphatically painted mouth, with its bold pink tongue, and one assertive eye anchored the free-wheeling strokes.

Although Maurer worked in many modes, he is perhaps best known as the first American to "get" Fauvism—not surprisingly, since he encountered Fauvist painting directly during a long sojourn in Paris, where he was part of Gertrude Stein's circle, before World War I. Reflecting the importance of this part of Maurer's evolution, *Aestheticism to Modernism* was rich in the fresh, angular landscapes that he produced from about 1907 through the 1920s, as he tested the possibilities of full-throttle color as a way of evoking space and light. Good as many of these pictures are, fewer examples might have made the point, given the gallery's space constraints, although the selection did, for the most part, enlarge your sense of the painter's capabilities. The same cannot be said of the show's multiple flower paintings. While they demonstrated Maurer's considerable gifts as a colorist and his vigorous touch, their sheer numbers diminished the impact of the best individual works. Yet despite the crowding and the repetitiveness, the show reinforced Epstein's thesis that Maurer's evolution was consistent, no matter how often he changed subject or shifted emphasis or altered his approach. His enthusiasm for experiment, like his debt to Matisse (who was only a year his senior), to Braque, and ultimately, to Cézanne, were made clear, but in the end, Maurer's individuality and his strengths were reaffirmed: his ability to construct forthright, confrontational images that look like no one else's, to draw with syncopated energy, and to orchestrate radiant, full-spectrum hues and murky half-tones with equally expressive effect.

Even though Maurer's reputation rests with his modernist pictures (and by having advised Barnes on acquisitions for a while), the show placed special emphasis on his early efforts. These relatively dark, naturalistic paintings, which won Maurer considerable praise and attention before he plunged headlong into the modernist maelstrom, seem equally indebted to Whistler at his most robust and to the Manet of the Washington *Bal à l'Opéra*—a sort of souped-up Ashcan-School-*cum*-Post-Impressionist view of modern life. Epstein believes that the roots of the most radical aspects of Maurer's mature work are to be found in the bold

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paint handling, broadly applied patches of color, and manic energy of the early pictures. I'm not convinced you could anticipate Maurer's severe, near-monochrome, subtly inflected Cubist still lifes from—say—the sinuous silhouettes and bravura flourishes of his early café scenes, for all their chromatic and compositional inventiveness, but you can certainly tell that their author was someone to keep an eye on. Absent that full scale retrospective in a proper setting, I'm grateful to Epstein and Hollis-Taggart for this imperfect but impressive glimpse of Maurer whole.

Further up Madison, at Janos Gat Gallery, other revelations awaited: the work of Istvan Farkas, a Hungarian modernist, killed at Auschwitz, unknown here, but acclaimed as his own country's leading painter and well known in Paris before World War II. The survey show, spanning the mid-1920s to the early 1940s, was of necessity small and made up of available pictures, but still, a recognizable personality emerged—a sort of central European Milton Avery, a chronicler of domestic pleasures veiled with angst. Farkas, like Avery, seems to have been equally drawn to the flattened planes of Synthetic Cubism and the broad expanses of heightened hues of Matisse; some pictures suggested, too, an interest in Braque's dense, generous manner of composing and his way of pulling lights and brights out of darks. What seems Farkas's own is a brushiness and delicacy verging on wispiness and a mood of wistful melancholy. An *al fresco* lunch party, painted in 1929, was at first glance, sunny and robust, with figures compressed into blocky planes brought close to the surface in a setting of springtime greens, embedded in a matrix of brushy blacks. Longer viewing made the pastoral idyll seem unstable. About a decade later, Farkas treated the theme even more somberly, as a group of figures relaxing in a rather bleak garden, a wide, featureless space separated from even wider, more featureless spaces by a fragile picket fence, with everything bathed in rosy, curiously gloomy light. The sense of impermanence and transience was heightened by Farkas's preferred medium of tempera on wood. His paint sits up on the surface, making brushmarks into major events; the opaque tempera seems—oddly—almost transparent, so that materiality and thinness compete for dominance. The show was a useful reminder of how messy and irregular the history of modernism really is, not a neat linear progression, but a nearly incomprehensible maze of tangled threads.

A very different aspect of modernism was examined by *Pasted Papers: Collage and Abstraction in the 20th Century*, organized by E. A. Carmean, Jr. for Knoedler and Company. This thoughtful survey of what Carmean calls "one of the twentieth century's great inventions" included exemplary (and often surprising) works by just

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about all of collage's best known practitioners—Picasso, Matisse, Juan Gris, Kurt Schwitters, Joseph Cornell, Robert Motherwell, and Helen Frankenthaler. (That Braque was absent was surprising, given the magnificent exhibition of his collages organized by Carmean when he was a curator at the National Gallery.) Artists less obviously associated with the medium, such as Hans Hofmann and Jackson Pollock, were also well represented; Hofmann's bold black-and-white brush drawing, its space transformed by the imposition of a sheet of paper with vigorous colored marks, and Pollock's little diptych of silvery poured canvases, one panel punctuated by a crushed paint tube, were among the most engaging works in the show.

Pasted Papers posed questions about the roles of chance and choice, accident and will. It examined the differences between using collaged materials to refer to something other than themselves and as tangible substitutes for more insubstantial media or as anything in between. Along the way, it also explored the history of collage, most succinctly, perhaps, in the witty pairing of a textbook Picasso, complete with a cut-and-pasted wineglass and a drawn pipe, with a Jasper Johns incorporating a cut-out portrait of Picasso among (and as) wineglass images. Three energetic Frankenthalers, spanning almost all of her career, were outstanding, the Motherwells and Schwitterses were a delight, and the Ad Reinhardt, testimony to his understanding of color's structural properties. It was an exhibition any museum would have been proud of.

Frankenthaler's collages were given a context by a survey of her paintings from private collections, mostly from the 1960s and 1970s, at Ameringer Howard. The pleasure of seeing a good selection of vintage Frankenthalers was enhanced by the unfamiliarity of many of the works on view and by their being, on the whole, at the tough rather than the lyrical end of her spectrum. (Which is not to say that they weren't beautiful.) Among the most memorable: a large plummy painting that seemed to pulse between heat and dusky non-color, its vertical and horizontal axes asserted by emphatic drawing and a vigorous swoop of thick pigment; a big citrus-green picture with a shifting mass of declarative brown, purple-brown, and dull green strokes, like a dissected landscape reconstituted in pure painting terms; a radiant peach-orange-gold vertical canvas with a strangely uncomfortable but absolutely essential floating rectangle of duller gold, one of those inexplicable and necessary moves that Frankenthaler characterizes as "the wrong thing that makes it right." As always, the pictures depended not only on the artist's obvious gifts as a colorist, but also on her sensitivity to subtle relationships of the size and proportion of painting incidents to the size and proportion of the canvas. As

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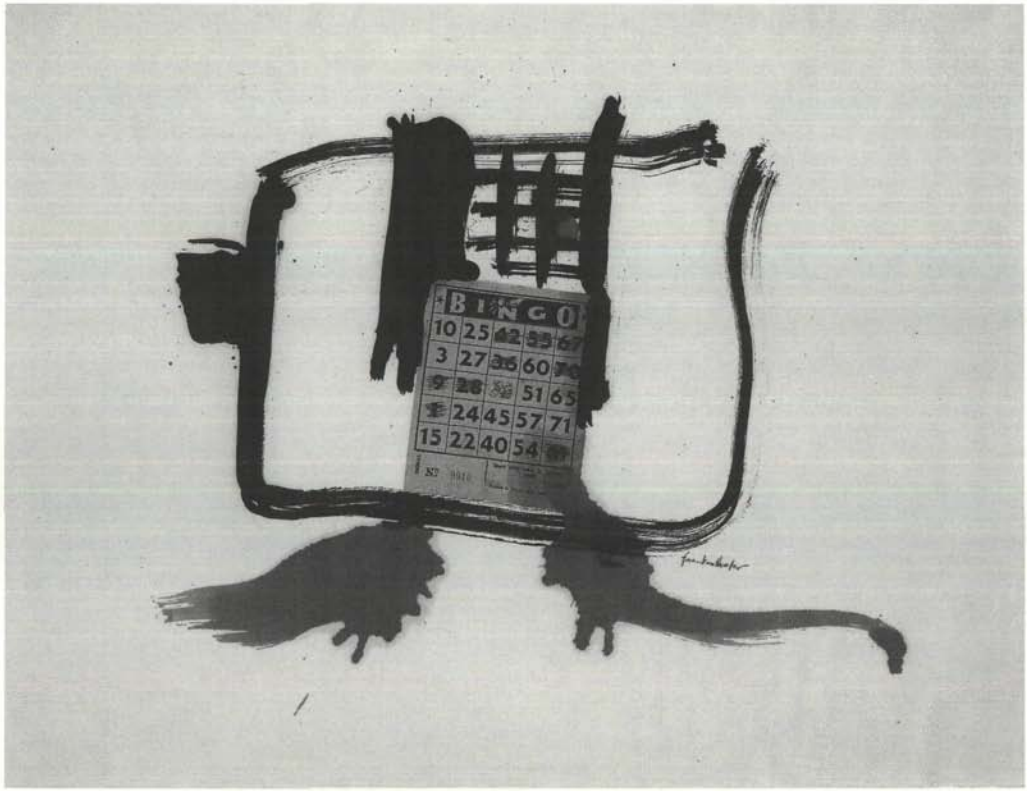

Bingo (1962) by Helen Frankenthaler. Mixed media on paper. 18 ½ by 24 ¾ inches. Courtesy of Knoedler & Company.

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always, Frankenthaler's acute intuition, intelligence, and all-out passion for both the act and the tradition of painting were manifest.

Other types of intuition, intelligence, and passion were also manifest at the much-touted Cecily Brown's show at Gagosian in Soho—Brown has been much-touted, not the show—along the lines of instinct for marketing, canniness about current art modes, and appetite for self-promotion. Brown paints immense webs of arbitrary, nervous, layered strokes that vaguely intimate images of sexual organs and figures. These latent configurations seem to interest her, but most of what happens on her huge canvases seems to be dogged, mechanical filling-in. Nothing that goes on within any of the pictures suggests any compelling reason for it to be the size, shape, or proportion that it is; color is predictable and surfaces slack. Brown appears to have looked at de Kooning reproductions, but not hard enough. For all the hype, the self-conscious naughtiness, and the self-importance of her pictures, she is a dull painter.

You'd have done better, while in Soho, to visit Richard Tuttle's show of recent works at Sperone Westwater. Cryptically titled *Two With Any To*, the exhibition consisted of "relief paintings" on plywood panels about twelve inches square. Each square pitted idiosyncratic, delicately scaled painted shapes against applied geometric solids, their various faces subverted by hues as quirky as the shapes. These intimate little constructed pictures blurred the distinctions between illusion and fact, painting and relief, invention and actuality. Each one set up a seemingly straightforward but complex dialogue between flat surface and bulk, painting gesture and real form, with the added complication of the real form's having been altered by painting gestures and changes in hue. The insistent presence of the plywood not only worked in terms of color, but also served to return you to the realm of physical object whenever you became too engaged by pictorial subtleties. Tuttle's provocative, slightly uncanny works demanded—and repaid—close attention. Their author has been a quiet presence for thirty years; the soft-spoken authority of these recent pictures was evidence that he continues to evolve and grow.

Like Tuttle, David Humphrey is fascinated by the tension between what is literally present in a picture, what you are conditioned to read as illusion, and an ineffable zone somewhere between the two. His firmly constructed, but unstable images, seen at McKee Gallery, depend on layers of elegantly drawn and painted fragments, each with its own scale, viewpoint, and often, painting language, all presented in delicate marzipan colors. Equivocal bits of heads, hands, and voluptuous torsos pulse in and out of each other, changing scales and relationships, as though these static configurations were morphing into different spatial

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zones. Bleeds of paint gather themselves into crisply drawn fusions of the mechanical and the erotic before subsiding into paint again. A chandelier seems to thrust one branch out of the plane of the canvas, as though propelled by the force of a cropped, swirling nude beneath it, who dissolves into a diaphanous spray of pigment. At once playful and disturbing, these beautifully painted pictures challenge both the literal flatness of the canvas and the fictions of illusionistic painting.

Down the hall from McKee, Mary Boone offered Damian Loeb's recent efforts: crabbed, oversized, hyperrealist views of a scuzzy America populated with anorexic Asian women, tacky buildings and furniture, and vaguely hostile signs. The banality of Loeb's photobased work was self-evident, but it was neatly underlined by his show's overlapping with a "real" photography exhibition that instead of simply posturing, commented profoundly on the appearance and social issues of an earlier moment in twentieth-century America: the Metropolitan's superb Walker Evans retrospective, a gathering of mysteriously potent, deceptively artless images capable of provoking total emotional surrender at the same time that they inspire coolheaded scrutiny of their formal means. I should admit that I'm slightly irrational about Evans, ever since being sandbagged by one of his least prepossessing photos, a seemingly casual, if elegantly composed shot of a pair of generic pants and an equally generic shirt hanging on the back of a door—nothing else. As I looked, a painter friend's name flashed into my head; later, I discovered that the picture had been made in my friend's house in Maine, where I had never been. I can't explain it, except as evidence of Evans's ability to get to the root of things.

At the Met, you watch Evans developing and refining his distinctive vision, rapidly discovering both the themes and formal means that preoccupied him for the rest of his life. The iconic pictures are there—the sharecroppers' families, the small town Main Streets, the people on the subway—plus less familiar images, equally cool and mesmerizing, that enlarge your sense of what Evans was about. An empty street lined with nineteenth-century factory buildings in Amsterdam, New York, makes his connection with Eugène Atget palpable, while dispassionate records of the inhabitants of Southern towns remind you that he admired the forthright reporting of Matthew Brady. It all seems so effortless, direct, and formally transparent that it takes a while for the subtlety of Evans's methods to register: the frontality, the truing and fairing of planes, the acute awareness of patterns, internal rhythms, and the shapes of things, the unfailing eye for tonal nuance. Like a vernacular Vermeer, Evans captures and endlessly prolongs moments

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apparently without significance, turning them into absorbing structures of tone and line that embody, without illustrating, feeling.

The Met provides a slide show of a series of railroad photos, in color, that Evans took when he worked for *Fortune*, along with a selection of unfamiliar late efforts, useful mainly as context. There are also enthralling items from the Evans Archive, including scrapbooks of bizarre images clipped from papers and magazines, as illuminating footnotes to the main event—those unforgettable, intensely *seen*, scrupulously chosen, deadpan images. And there is an excellent, fully illustrated catalogue.

What else? In Chelsea, an uneven, but interesting group show of paintings on paper at Jay Grimm, and Ed Moses's big, gutsy recent paintings at Nicole Klagsbrun. Melissa Meyers's brushy, sensuous paintings were the highpoint of the group exhibition: radiant, energetically painted grids, unravelling into broad planes and calligraphic strokes, like distillations of landscape and plant forms, of the light and colors of the natural world, into loose-jointed geometry. I kept getting echoes of Matisse, especially of the cutouts, from Meyers's pictures, which didn't in any way diminish their individuality or vitality or evocative power. Among the other works at Jay Grimm, Gary Petersen's crisp little pictures risked being a little too well designed, but his delicate touch and oddball color sense made the best of them both appealing and worth taking seriously. Nancy Diamond's washy watercolor nudes, body fragments, and heads, like pages torn from a notebook, were sensitive, but explored familiar territory.

Moses's abstractions keep faith with a tradition of paintings that are about their own history, a notion of revealing emotion by making. It takes time for his pictures to come alive, but they're worth the effort. Their generous, stuttering cascades of pigment, witness to both the unbridled flow of paint and the painter's willful interruption of that flow, enter into dialogues of likeness and unlikeness across the surface of the canvas, becoming confrontational images that demand attention the way natural formations do. Moses's point of departure is a range of greys, off-whites, and warm blacks, a palette of non-colors that suggests, like his scraped, staccato floods of paint, a desire to cancel the implicit lushness and sensuality of the paintings. At Klagsbrun, I thought the pictures in which the grey-blacks flushed into sombre purples were stronger than the monochromes, but the seriousness, energy, and ambition of the entire exhibition was impressive.

At the Morgan Library, *From Bruegel to Rubens: Netherlandish and Flemish Drawings* demonstrated, once again, the apparently inexhaustible depth, breadth, and astonishing richness of its collections—with a promised gift and a few key loans as garnish. More impressive is

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Young Man Holding a Skull and a Tulip (1614) by Hendrick Goltzius. Pen and brown ink. 18 1/8 by 13 15/16 inches. Courtesy of The Morgan Library.

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that the hundred or so superb works on view—some familiar treasures, others utterly surprising—represent only about a quarter of the Morgan's holdings in this area. The show (which includes exemplary works by artists both before and after Bruegel and Rubens, including a newly acquired and spectacular Rembrandt landscape) examines the increasing importance of drawing on paper to the preparation of paintings, prints, tapestries, and the like, for Flemish and Netherlandish artists in the fifteenth, sixteenth, and seventeenth centuries. Along the way, it demonstrates not only the evolution of drawing languages, but of methods and techniques, from meticulous pen drawings to spontaneous pencil studies and uninhibited ink washes. What is perhaps most exciting to modern-day viewers, it also allows you to see how these artists used drawing as a way of discovering their world. Alongside the marvelous studies for altarpieces, allegories, genre scenes, and portraits are informal drawings of astonishing immediacy recording the fall of drapery or a stretch of woodland or a member of the artist's family. There are Rubenses and Van Dycks like graphs of thought processes—rapid sketches that make ideas visible, probe poses and gestures, test compositional alternatives.

Throughout, the show offers testimony to a Northern taste for the irregular, the complex, and the clearly defined, even among the Flemings and Netherlanders who went to Italy or looked hard at Italian art. While the exhibition is full of wonderful things, the large number of landscape drawings, whether done from observation or invented, are particularly engaging, perhaps because they seem so direct or because in paintings, the wide panoramic, symbolic landscapes for which Northern artists were famous serve mainly as backgrounds. A splendid Pieter Bruegel the Elder landscape drawing provides an intimate view into the origins of his celebrated paintings of the seasons.

Several artists are represented in depth. Virtually all aspects of Hendrick Goltzius's activity are represented—portraits, mythological subjects, preparation for an engraving (a wonderful head in which line embraces and creates volumetric form, rather than outlining it), and more. Rubens is treated to a mini-retrospective that includes fascinating evidence of the works he studied during his years in Italy and how he transformed them; it's particularly illuminating to watch him wrestle Raphael into submission in a drawing after a fresco in the Farnesina. Van Dyck and de Gheyn, among others, are similarly represented by groups of remarkable works. And as if that weren't enough, the occasional illuminated manuscript, album of drawings, and related illustrated book has been added to provide context. All in all, an extraordinary exhibition that requires and rewards multiple visits—as you expect of the Morgan.

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ARNOST LUSTIG

Lea of Leuwarden

"YES," SHE ENCOURAGED ME.

"Yes," I let myself be encouraged.

"I'd like to tell you that I'll be with you for a long time," she said. And then: "But it wouldn't be the truth."

"I'd like to tell you that I'll stay with you forever if you'll be nice to me, if you won't forget about me," she continued.

"Yes," I whispered.

"But it wouldn't be the truth," she said again. "Nobody loves anybody else more than himself." There was a pause. Then she said, "Do you want to have a baby with me?"

"It's fine the way it is now," I whispered again. "That's all there is."

"It has to be fine," she said.

Then she told me to come nearer, as close as I could get to her, and let her get as close as she could to me. "Closer—the closest you can," she said.

I caressed her face, her forehead, and her hair with both my hands, connected by my body in her body, by my soul or part of my soul with hers. It formed something that was beyond time or the dimension we were in, something that compacted and accelerated everything. Instinct told me all that was good or not so good about her. I could not only see it with my eyes but I also breathed it in, from her whisper to all her touches combined, just like from each one alone. They all merged into something as all-embracing as light, the sun, or the stars. Her face looked like it was made out of porcelain and it was prettier than I had ever seen it before. Making love had softened and colored it, endowing her with a new beauty. She glistened with sweat. Both of us were changed. I placed the tip of my finger on her throat and felt her pulse, her blood throbbing. Her skin was warm, heated by fear and expectation. Her nakedness made her seem defenseless, just like it makes a man look stronger. I looked for the strength in her weakness, weakness in her strength. She had always resembled a beautiful animal—one that had strayed too far and perhaps already knew that it would never find its way home again. The sense it made was beautiful and sad at the same time because it couldn't last, even if we could have drawn it out forever.

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Naked, she reached perfection. I didn't need light to see that. Smooth, tight skin covered her shoulders, head and face, her breasts down to her waist and belly, hips and thighs. Her body expressed everything for her, just as did her open eyes, her erect breasts and her warm lap, the tender, winding mazes of her small ears and her face that had not lost its pain, fatigue, and yearning. Her body was the picture of one single thought. There wasn't any now or never anymore yet at the same time, now and never composed the moment; that now, here and omnipresent never.

I had never seen a more beautiful being either before or after. But that was already different to me, too. I stroked the real her inside. And just like no one can ever get back home again after being away for a long time, even if his home hasn't changed in the meantime and he hasn't either, and how things would never be the way they had been up to that moment, Lea had transformed with the approaching daylight into someone I didn't know, maybe somebody she didn't even know herself. Was she crying? I couldn't tell; I only knew her eyes were wet. She whispered something that I didn't understand: How much can a person care for another person? What makes him like or dislike himself? How can he give another person a little pleasure or a piece of himself—or all his pleasure?

She was different from the way she'd been yesterday, from last night and now. Maybe I was different from last night, too. We were strangers and at the same time, we were no longer unfamiliar to each other. I sensed her chest and heart speaking to me with each beat. The rest of her was an eighteen year old, possibly immortal, but tired spirit. A memory of a memory; a here and now that never carries over to tomorrow. We had already gotten used to being people without a future. The place between life and death was a new center with uncharted borders, something that was merely between yes and no, a lengthy meantime, that perhaps meant waiting but without the slightest hope. We already knew that hope meant fullness and hopelessness emptiness, and we no longer had anything more than our bodies and souls and a piece of the night until morning would come. She soaked up my patience and impatience. She couldn't have known what was going on inside of me. She edged up to my tenseness like an invisible wall and let her mouth open slightly in anticipation and invitation. Her lips were warm and moist and held the taste of wine drunk long ago or juice or thirst. The sun that looked out of her eyes was not rising but setting. Timelessly. I wanted it to be the other way around but it wasn't. They would probably cut off the strands of golden hair that had fallen on her forehead as early as tomorrow or the day after. She licked her lips and kissed me gently,

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lightly, and wetly in her incomparable way. Her kiss coursed through me, softening and pervading my whole body like blood.

She was unique, just like every woman is, like every person is. She started stroking my hips, my thighs and my groin again with her palms. She touched me swiftly, with experience, saying nothing. The dark had lost its strength. It would be light in a little bit.

"You are beautiful," I said again, very close to her.

"You're beautiful, too," she answered in a whisper. She continued, close to my face, "beautiful in how you want to see things better than they really are, in what love has taught you or hasn't taught you yet—in how you're young, barely grown-up. For the little hatred that I've seen in you even if you speak about it. For the childish desire you have to get revenge. For your silly sense of fairness. How you warm me as if I was going to freeze any second. The way you touch me; how and why you came to see me."

Her words contained everything that was and would be; what hadn't happened and never would again.

"This is the last time, here and now, that you'll look the way you do and be the way you are," she whispered. "How you could be with me or without me; how I could be myself too."

She kept touching me. She didn't have to convince herself anymore. She was ready for me, as much and as many times as I would be ready for her.

Then we were together, beyond the world of thoughts, but not their echo, by something that joins mutual consent and desire and longing and which no one understands. The way a person is still an animal but at the same time himself; what is made of him with someone who takes him in as if he was accepting himself. I sensed what stood for her last proof of freedom, what made her body hers so that she was allowed to decide what and how and with whom she would be. The way in which she could retain her dignity and still be what she was. Was this the last free choice she had before they forced her to go someplace where the words freedom or choice don't exist—a place where all a person tries to do is survive, only survive, without any idea for how long and at what price?

She embraced me yet again. The strength in her arms, chest, hips, and lips joined with mine. It was a gentle, tender power. Then she spread herself open like a fissure running through stone, like a mouth opening. The light dawn brings flooded her with rays which slipped all over her skin. The moon had long moved to the morning side of the sky. She held me with parted lips and her eyes wide. I held her the same way in my arms before the streak of morning swelled.

Her beauty was like light and dark, twilight and daybreak that touch and swallow each other. She was dazzling in the way nature is dazzling,

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like the sun, the stars, and the forest, like mountains and abysses. The grasp I felt from within her a man could dream about until he dies. Or only dream. We were the same in everything else. All of a sudden what we were doing didn't have anything in common with how she didn't want to give someone pleasure or how she wanted to stop or spoil the act or pretend like it wasn't happening; how she never acted like a customer of hers thought she would or how they wanted her to. She left me to figure her out on my own. Neither her nervousness nor implacability bothered me anymore. I knew she couldn't be only one person. No one is ever just one person. Maybe my presence made her become aware of things she didn't want to think of in spite of the daylight, to see and hear things she no longer wanted to think about. I heard her exhale deeply, then sob and start crying.

I remembered what my older friend of sorts, Vili Feld, the man who was the reason I had come to her, had said (and how the two thoughtful creases about the ridge of his nose had almost taken on an expression of fury), that she was hysterical and neurotic in a thousand ways that almost wiped out what was good about her and how there was no way of knowing what to do when she got crazy. It had always astounded him and he could have done without it.

She wanted to see me in the morning light. I did, too. I didn't tell her how pretty she was anymore; she could read it by the expression on my face, by the way I was smiling. Did she want me to sing to her? She languored in her beauty like someone who inhabits a world they leave and come back to, a world in which they either get older or take with them on their way to destruction. She had the look of a cave where the only light comes in the morning when the stars are leaving. Her beauty was like a smoldering sun, a waning moon. I took in the parts of her body that she bared and what she showed only to me. I already knew from one of the camp inmates called Black Joe about the difference between somebody being naked for everybody or just for one person. She was naked only for me. In that moment it meant everything.

I felt what people feel when they are happy when something has happened. I knew what I had achieved even if the part of her with Vili Feld's name on it wasn't as big as I had thought it had been. He wasn't the only thing I was trying to live up to anymore. He paled in retrospect. Something in me had evened up with him. Maybe I matured in that moment, by one of those thousands of invisible steps towards being old, through new experiences on the passage to death. Some shifts come all at once, unexpectedly. Didn't I know that even they can be beautiful? There were probably a thousand ways a person could go to his death and what had happened was my way. Something that was only mine became a part of

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all the others. Vili Feld moved from the front of my mind to the back. Lea's face had remained calm and serious through it all.

I could only catch part of what her expression and breath meant. Her touches. The beautiful body of Lea from Leuwarden; her entire figure and a little bit of her dying soul that she had committed to me. The flesh that first revels in and then regurgitates it all back out like prehistoric creatures that ingested and excreted everything through their mouths.

She slowly repeated what she wanted from me. "More, more."

"Yes."

"Everything."

"Yes."

"Yes."

"Everything." We could have each been speaking for ourselves or for one another and everything we said had more than one meaning. I was capable of dying in that moment and so was she. The feeling poured through my blood and my breath brought it back to life.

And then suddenly all she did was sob, like women do. She was crying and happy at the same time. I became conscious of her breath and mouth, her teeth, tongue and lips. It was a hot, all-stirring wave that rids the world of everything that is not here and now. Then everything was just noises again, movements and silence. Closed and half-opened eyes. Parted lips, touching each other like the wings of a butterfly touch the wind, like rocks attached to each other and time to all its ages, like a single second or a fraction of one.

"Nobody can take this away from us," I whispered. "Not even all the owners of the world put together: Germans, the authorities, the powerful—not even us."

"It's only here and now."

"Why?"

"Don't say anything."

"Yes."

"Not a word."

She whispered it into my face so closely that I could hardly hear her. "You're only free if you are an animal. You're alive because you live how you want, with whom you want. Nobody tells you what to do or what and how to go after something. You're a part of the world and outside of it too. It doesn't matter to you if you die or are born. Indifference runs through you like the heat of an animal. You only know what is, not what isn't."

Did I want more than that? Maybe I did, maybe not. And Lea? I don't know. It took over the moment that our time had filled, the moment we had touched beyond time. We were the exception to everything that had

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happened. In that way we were joined by the best that a man and a woman have for each other. She didn't have to say any of the things she didn't want to say and what she had to say before like so many other people whose word was penetrated by a lie to such a great extent that the lie cast a shadow on the truth at the same time it swallowed it and always split the soul of everyone in two. The fact that everybody's soul had become a combination of truth and its opposite, which gave a two-sided face to everyone's existence and didn't matter anymore.

I didn't have the strength or intention to argue or contradict her. She couldn't do the same to me either. She didn't look like she was dying. Then she mounted me again like I had mounted her body and everything started again because nothing had stopped—and for a little while she granted me the greatness that only a woman can give a man, even if he is just barely maturing in that moment and maybe, just for that reason. For a few moments it seemed like a non-moving race, the meeting of two bodies erasing guilt and innocence, skin, hearts, and souls touching. Fear evaporated in it. What had only been in the stars up to that moment was now on earth, here. How a person is fated to another. What he was born for. The moment when everything is and is not, many times larger, many times more evident, but always for the two who are touching. It was a moment when two people seem as inseparable as they were yesterday, and how they would be strangers to each other in a little while again.

"You are alive," I said. "You are beautiful."

"I am alive," she repeated. "Maybe."

"You can believe me."

"I know what it's like."

"Tell me."

"If you don't have hope, you don't expect anything. Good is bad and worse the worst you get."

"It's not like that," I objected. "It's like a line that you hold on to. Some invisible road that you don't know about yet."

"You and I," she said.

"You and I were two people just like all the you's and I's of all the people who have existed up to that moment everywhere on earth, and it joined us with them, and with the people who would one day exist until the end of human time."

"I'm living and dying at the same time—I can't help it," she said. "And sometimes I'm not dying but I don't live like I am right now. All I can do is scream. And I'm ashamed of it. Not only because of the people next door. I'm hysterical."

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And then she said, "Sometimes you only do what you really want until the very end. You know what I mean."

We were naked like a river and water. With everything that was, is, and would be, the way a person sets the animal inside himself free or tames it; the animal that always comes back to him, that makes his heart expand or become smaller. How his heart is bigger than he is himself.

"There is nothing left that either one of us has to do," she said.

"What do you mean?"

"That burning feeling and lack of satisfaction," she answered. "Pain and painlessness. A day that is longer than a year and a second longer than eternity."

I knew what she was talking about right then: about a madness that is either under or out of control; about the time when we all go mad.

"Desire and tenderness. A touch of selfishness. Maybe that's really the sense of it all," she said. Then she added, "One time, a friend of yours taught me that not even the best or the most beautiful body is enough for a woman to be a man's lover. You probably know what I'm trying to say." Then: "Colors come over me every time and then I know it's for real. Dark red, purple, orange. Dark blue. They shoot through the border between my heart and brain into every little part of my body. And then I start sweating all along my back and over my breasts. I can't help but scream, I'm sorry. It's like the dark coming into color, where everything shines before I go out again."

After it was over she said, "You can do. . .everything. . .and so can I." She exhaled. "A person will do anything when there's nobody watching."

I touched her with my mouth. She touched me with hers. Within, she was bare and rosy. She was everything she had been before she'd been born, before her mother conceived her and before her father betrayed them in the last camp. She was everything for as far back in the past as she would be in the future, like the fresh leaves of trees, fruit, rosy petals. The scent of her body and sin mixed with the clean bed she had slept in last. She told me that a man smells like the boy of the woman who last held him in her arms and from the chest down he smells like fallen apples and mild vinegar or weak wine that a few drops of sea water has been added to, or like the rusty water a woman drinks from an iron mug. I thought about how a woman smells like a man's hands, his chest, and his groin. Like the scent of children. Like strong wine. And how a woman's lap and breasts smell just like her mouth.

She no longer had to hide the things in her that were superior under a mask that didn't suit her or anybody else either. We were better off without the pretty hypocrisies that got passed off as sincerity. She was

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better for what she had done for me and for herself, and for what she had gotten only from herself and what she had been able to give away. This was the true innocence. It was composed of both our scents mixed perhaps with green poison that newborns sometimes accidentally swallow during birth. She had taken me in like a woman accepting a victim. She spoke with her mouth but her body was a mouth, too. It cleaned me. I have no idea how long it lasted.

She lay gazing at the sky through the window that jutted out from the sloping roof. Her body and eyes themselves were open doors another person could pass through and never look back. The sky brightened. A short streak set the clouds off from each other. In a little while the sky would become a brilliant blue, the sun gold; it was everything that lasts and passes away. Eternity. I thought about the rain and the blue sky, the mountains and flatlands, trees and meadows, about the world that was somewhere and which we would get a look at on our journey to the east.

"So now you've seen a star fall," she said.

"It granted my wish," I added.

Her voice sounded deeper, like when you wake up early in the morning and rasp.

The sky covered an emptiness that set it apart from the earth. That secret, heavenly river that had not been holy for a long time. It was heading toward an unknown sea with us in tow. The incomprehensible or indestructible and at the same time wretched. She closed her eyes. The river was lost under her lids. I sensed how everything—utterly everything—begins and ends.

The little attic took on the dimensions it had lost. Night had already transformed into day, and light into motion. Shadows gone, everything took on its earthly form: boxes, suitcases, a purse of crocodile skin, cases. A couple of spiders climbed the ledge of the window. Earwigs and bedbugs meandered along the edge of the wall. She didn't notice them and I tried not to see them either. It was Wednesday. Lea looked through the window at the place where she would be in just a couple of hours.

"It's never all there is," she said.

"It's what I wanted."

"Was it so much for you?"

"We're different people," I said. "It meant a lot to me."

For a moment it occurred to me what our children might look like. I sensed the presence of a third person.

"For as much as you come alive during it, it takes my life away."

"It wasn't like that for me," I said. I still didn't believe that something bad could happen to me, or worse than what had already happened.

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Something after which there was no one and nothing. That was an unreachable place for me, farther than where I was now, or where I ever wanted to get to. And at the same time it was here simply and honestly and lovingly, for the two of us.

"You and I," she said.

I thought about how, for her, life was an infectious cancer. There was death in every moment, in every wrinkle, in every movement of the eyelids, eyelashes, or eyebrows. Everything that took place rid her of control of the things that made her beautiful and what offered her control of something, at least.

Her eyes held that which had escaped her, how she was pretty in a different way from where she had been inside to the form of existence she carried on the outside. The time that she had cut short began running again.

"It's the third time they're moving us," she said. "They're not going to let off the killed and wounded this time. That'll be a pretty sight: everyone from the first to the last will be there."

"Terezin is a garish city," I said. "The fortress. I never lived in a place like this before with ramparts and a moat and all the things that go along with a place like that."

She smiled. "Maybe it's just cheap. You can get a girl here for a rose or ten grams of sugar or a couple of grams of margarine. . .and a man? He comes free."

She was wearing yesterday's porcelain smile. Her high eyebrows had fallen a little like tired or sad women's do before she raised them again and her eyes brightened.

"You can leave me that rose you stole now. I changed my mind. I'll deal with what it looks like somehow."

I didn't have to think very hard to figure out what she was saying. I didn't know if she was planning on turning me in—or just herself. And why she would do that? Would it be hard on her? Maybe for a little while. Who knew? Whatever had been important yesterday no longer was. It wasn't only the unpleasantness that I didn't like. I remembered that she had said she was married and why she had done so at the last moment—and what she had told me about before, how Vili Feld, her husband, was just as obsessed with her in the fortress with what he had been in Prague. What he was really like in life and what he probably wasn't even if he thought himself to be—and what he most likely was instead. Aren't we all selling something that shouldn't be paid for? Who doesn't act like their hearts are a piece of paper that they can tear apart, crumple up and throw away? The heart is cheap stuff too.

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I couldn't really say that I had seduced her. Only that we had been together, and how, and what it would mean to me from here on after whenever I would think of it, like everything that was important to me in my life, if maybe not all that decisive. What a permanent relationship between a woman and a man and a man and a woman is born of or at least the memory of one without thinking about how long it lasted or how quickly it had gone by. Who knew that was meaningful in someone's life or what remained that way in some sense? "Seduce" wasn't the right word for it; not even "sleeping together" was accurate. It was something that people want more of than they can get. And it's what marks them for as long as they live just like the inexplicable does.

It was a beauty that evoked a longing for everything that happens only once; for everything that appears and disappears at the same time. Every pleasure caused her sorrow. It wasn't in her power to reverse it. There was an anxiety in her eyes from all that she did; what had changed irrevocably for her and what she couldn't (and she wasn't the only one) make cold blooded sense of. The need or intensity she had suppressed in her screaming had not dwindled away. The thousand-sided face of tension and selfishness. A satisfaction that was never found or never relinquished. Why did it last only for a moment before it disappeared? What can only happen once and never again? And which isn't all the more understandable or clear because of it?

She breathed in deeply and exhaled and spread her arms. She wore the expression of a person who was lost in herself. Her face had that look of sleep which comes before a deeper one. She didn't have the strength she appeared to have even though I looked stronger that morning myself.

"I can't stop thinking about how beautiful you are."

"Maybe you just see me that way."

"It's the truth."

"I don't want to get old."

I smiled. I knew every one of her movements. I didn't want to remind her that my Grandma Olga would say: whoever didn't want to grow old has to die when they're young. I had a living example of it in front of my face.

"I'm sure you'll find people in the east that will be nice to you." (I was thinking about Gotlieb Faber; about people who would be willing or able to buy at least a little part of her.)

"Do you really think that?"

"You don't know who they are?" She knew what I was talking about.

All at once she said, "You are a friend of my heart."

I almost choked. A hot burst of blood went through my veins. I shut my eyes a couple of times.

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My Grandma Olga used to say that I was born as a love child but no one had ever called me a 'friend of the heart.' We had come a long way since yesterday. I sensed what would be different inside me forever.

"You say nice things to me. The very nicest."

"You do the same."

Then she said, "I've already done anything and everything to survive."

"I've also done everything I could just to live. Don't we all?" I kissed the inside of her palms. "It's what you foretold in the cards."

Next door the old people began stirring. Had the time come? Both of us could imagine them. People holding their heads firmly if bowed against their will, with backs that nothing and nobody would ever straighten out again, weakened by their last night in the fortress and unprepared for many days' journey by train where they would be squeezed by the hundreds into a space for forty. Men and women alike would take their aging bodies, their sunken chests, scrawny muscles, and knotty calves with them, their lined skin and wrinkles and bold heads. They would take their duck necks covered with age spots, their protruding bones and knuckles, along with all of their pain and scars. The motion of the train would be their only movement on a trip to destruction until they reached their final destination.

"I don't want to live like a pig," she said.

"Nobody wants to," I answered.

"I know it's not enough to only not want it," she added.

In the distance a whistle blew on the train tracks: two, three times. The wagons were already ready. I didn't want to talk about the train or the tracks or the trip or what the east probably meant for us. How was it that one word could contain all the evil of all the ages from the past through the present to the distant future? It was a new gauge of fear, a new gauge of evil. Something that maybe hadn't alarmed people, or, on the contrary, that had come like a shadow either in the same or a new shape. Who knew? I still didn't know that it was that way, that a new standard of evil had arrived with the Germans, or that evil rarely manifests all of its dimensions or shapes all at once. Did the worst always come slowly or quickly? Could you see them or was it invisible?

"It's a pleasure to look at you," I said.

"The train's all assembled now," she said. "You should go get your things. Even the engine is there. Two of them. Fifty wagons. They're sturdy. They don't want us to get stranded along the way."

She was sizing up the situation like a blind person or like somebody who knows more than they let on by noises and sounds, probably like the old people were doing. She was bound to them from the opposite side, by her

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youth, her eighteen years, and by her fear of dying. I knew she was right. And I knew too what I would take from her for myself, like a person carries away a piece of another person; I hoped it was the same for her.

She dressed towards the light as if she were a tree or a river or a stone. Like a flower before it wilts. Even though she had already put on warm underwear for the winter in the east, I could still smell her body. Love was a word that at that moment would maybe sound ridiculous or empty, but it was more than a false hope right then or some scheme or the fulfillment of a dream; more than mere revenge or making good on an old debt that a friend had seduced a girl I loved. More than only childish, half-childish, manly, or half-manly rivalry. Maybe it was ore how a person always wants to carve a piece out a little higher and farther for himself than where other people are or where he is himself; to take a stand or not take one, at least in the eyes of everyone else or in your own; then he finds out, like Lea of Leuwarden, that every breath brings him one step lower and closer to where he came from, but to which he would never return again. Who knew what it was? A kind of justice that we hand out ourselves, at least among each other, if not just from within? The morning had already lost the truth of last night and the evening before. It was a part of the feelings that make a person either bigger or smaller. The way he faces the world, and then returns to himself and gets lost inside so deeply he gets to places he has never been before.

The gratitude I felt towards her was the kind that translates into pleasure, self-confidence, and promise for a man. A gratitude he takes with him on his way into the future. Every person has a different meaning for the word friendship. I could only guess afterwards what it meant to the other person. Was it something that love is born of even if that only happens later on in a corner of the memory or far off in the future because everything would already have been long past by then? No one remains how he used to be forever. Were those tears in her eyes? She cast me a look full of uncertainty. Was this the last freedom she would feel before she died? She looked like she was made of china.

"I wanted you to be strong. To know that you're strong."

"You're strong too," I lied. "Stronger than you think you are."

"I wanted to give you what only a woman can give a man. So you would know beforehand how strong you are. How you will always be stronger." And then she said, "The last thing we always have are our bodies. The last freedom, the last will, the last principle. The moments when my body is only mine like your body is only yours."

"Was it a power that a woman gives a man or that a man takes from a woman? It lasts for as long and as far as life does, but at the same time

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it was what slowly eats life away. How it wanes. What was good and evil, permanent and fleeting, and what reassures a person and hurts too. Were we still the masters of our bodies?"

Next to Lea from Leuwarden that last moment on a Wednesday morning in September 1944, I thought about the secret art of accepting a person for what he was and wasn't, or what he could be, things a person doesn't ask or talk about because he doesn't know who he is himself and if he does then he keeps it to himself. It was truth and illusion, a fantasy only a little better than a lie and at the same time the truth because there isn't any other; everything that a person has and doesn't have and what he can and can't do and what he wants and doesn't want. Why? Because. A thousand reasons. What does it mean to be honest? Is it worth it in every situation? When is it better to forget? We'd have to deal with that in a couple of hours on the trip, each one of us in a different wagon.

She had returned to the absentmindedness people have when they get ready to go on a long trip, or people who live somewhere for a long time and when the time finally comes to leave they don't really know where they're going. Like somebody who still has the feeling the door isn't shut even after he's checked it ten times. The trip awaiting her would take her from warmth to winter; to the east. Who knew how many times the train would get held up on the way? She was thinking of how warmly she would have to dress, what shoes she would take.

"I also wanted you to know how strong you are. And how you are better." I didn't have to lie. "How it'll help you if you look after yourself like you did here."

I felt the presence of many people in her, especially certain people, one of whom was her benefactor, Gotlieb Faber. I wasn't trying to find out what she had paid for that help or what share Vili Feld had in all of it, or her father who had played his part, too. I selected to just put the name "many" on it.

She kissed me. I didn't want her to explain anything. I felt her tongue. The warmth and moisture of her mouth. Her face. Her lips. I put my fingers into her hair. Then I handed her my handkerchief. I didn't ask anything.

"Sometimes it's the only thing that you can get from a man," she said. Her beauty was sadder that morning than it had been last night.

More had happened than I had wanted to. It was something different than I had wanted, something that I could learn to live with. Everything that I had taken she had let me take, and what I had been able to give her she gave back. But that's how she was withering away like a person who is sick. Her eyes held the fear of a catastrophe bigger than herself, than the two of us, bigger than the world that she had lost an idea of

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and that increasingly filled her with a fear she found shameful. It had been that way for a long time. The early morning wind sounded like old people chattering, their words and screams. Like the echoes of old challenges and promises of new ones.

Next to Lea of Leuwarden, I remembered what Rabbi Cytron used to say at 24 Belgicka Street, about the light between the sun and the earth and about the twilight that wasn't day or night. About the dark that disperses and in which everything disappears. About what a person is, what he has or hasn't done and what even a dwindling echo gradually fades into before everything becomes an echo itself.

"It's already day," she said. "And a cold one. It'll be windy."

"Wear your warmest things. . . ."

She was already cringing.

"I feel naked no matter what I put on. It's like being naked inside. Everything is outside of yourself. Nothing will ever warm you up again. Cold is everywhere. It doesn't matter how thick a shawl you've got or how warm your boots or stockings are. It's the worst. So much has already happened so many times to so many people. You have to be careful if you ask somebody for something more. It's out of our hands. There always has to be two to try anything."

I kept silent.

"It's good that it came on a Wednesday."

"You don't have to make it bigger or less than what it is," I said. "It's just a trip that we're all going on."

I adjusted her feeling about numbers—that there had to be two or three of everything—in my mind. Or even four, if I counted Gotlieb Faber—and he probably wasn't just a selfless idealist, even if he had killed himself so that he wouldn't put anyone else in greater danger, except himself, than getting sent on a transport. (I could never figure out whether he took his life because of a guilty conscience, or out of weakness, or just the opposite, because he still had the strength to at least do something. Why then?)

"So many people vanish from us and we from them," she said.

Had she read my mind?

There were remnants of the last touches of night in her face. A bridge made of morning rays that she traipsed along from dusk to daybreak. Everything that was beyond words.

"Three is a lucky number, and it's yours too," I said.

All of a sudden I sensed death or dying behind her small porcelain face that I couldn't fight with mere words. It seemed like she was falling asleep or into a dream that she wouldn't have the power to wake up from again. It was in the tone of her alto voice, in the vessel or cage of her body, in the

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shadows that scared her inside. In the premonition that she lacked an explanation for. She had more fear in her than faith, more uncertainty than self-confidence, more anxiety than levelheadedness that could drive the fear away. She was eighteen years old. I understood her words in a different way than she meant them. She was taking my words in her own way too.

In the morning light of the little attic in the old people's home near the firehouse on L Street in Terezin, the Greater Fortress, at the end of September 1944, next to the beautiful and sad Lea from Leuwarden, recently married, without having spent her wedding night with her husband, with her long legs and face of porcelain, with her faultless skin stretching over every millimeter of her body, I thought how people would talk about what had gone on here some day and how it would all sound so far away and impossible, and how they would shake their heads in disbelief (at the selfishness or selflessness, the loyalty or infidelities, the betrayals and failures, at the truth and lies and self-delusion, at everything that has crippled people's spirits and backs for so long already, at what people run to and in what they seek relief and why, at the people who protected themselves or killed themselves, along with their whole families, or who gave in and obediently filed onto the trains to the east without a fight, humiliated and confused, who didn't even try to escape, not only because of the punishment those heroes got, but also because they didn't have anyone or anywhere to run to, aware of what was waiting for them at the end of the tracks and the ramp; at the fear and secrets of people, the old and the young, at the free love, the women for sale, and at not belonging anywhere) and I would know that each person had been taken somewhere, each had gone some place and somebody knew who he had been, and that they had been the children of known and unknown fathers, of known and unknown mothers. One of them had a daughter in Leuwarden who colored my last night in the fortress of Terezin with the shade of things never to be repeated, of everything that can happen only once. She leaned toward me again before I started getting dressed and kissed me.

I watched her as she put on her traveling outfit. She had young, firm, eighteen-year-old breasts. In the morning light I could see light blue veins rambling over her left breast like little paths of a map or a river, through which fear, shame, sadness, and blood flowed. Her skin was almost translucent. Her heart was pumping under the strongest vein. I noticed how her nipples leaned off to the sides of the shallow hollow between her breasts which called to mind large cone-shaped drops that descended into the smooth, soft skin of her throat.

"It's good luck to set out on a trip on Wednesday," I said.

"I heard about it Sunday."

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"They say that if you leave on Wednesday it'll be a long and easy trip."

"Of course," she said.

"Are you going to take your cards with you?"

"I don't take a step without them," she smiled.

"They could take you into an office somewhere, like the bosses here pick the prettiest and most capable."

And I told her again that the Nazis got confused when they saw somebody with golden hair and blue eyes like hers (at the very least, they gave those people preference). It was an advantage in some way. Even if all their talk about the Nordic races was probably wearing off by now, since they themselves were a far cry from it. Just look at Hitler or Himmler, or at Goering or Goebbels, and Rosenberg. I was desperate try and find a little honor at least in something. Maybe I even believed it a little. The poison of the greatest lie which had been repeated a thousand times had most likely infected everything including its victims and the subject of the lie itself. It was a lie of the ugly.

"I have no doubt they'll want to surround themselves with people like me," she said and the uncertainty in her voice didn't even sound like she was throwing it back in my face. "If their plan is to get rid of people with black and brown hair by mating them with pure blondes, I've got something to look forward to. No one has ever been able to regulate everything from the first to the last as they have. What you do, what you don't do, how and when you breathe, what you eat or love. From the cradle to the grave. All our pleasures, interests, and feelings. Desires and who is allowed to do what. They dictate how everything is supposed to be until there is a long list of all the things you can't do anymore."

She smiled her porcelain smile and glanced at her suitcases. She knew how unforgiving the Nazis were just like everybody did. And she knew that if we all didn't come out to stand in line at the same time, each person would get it in the end. *Jedem das seine*. It was and always would be a question of time, not of what color hair or skin or how beautiful or how ugly a person was, not even a question of luck or misfortune.

"So you see that a woman will cross the written and unwritten laws for a man—or against him—any place and any time."

"Am I supposed to ask why?"

"Not me," she replied, as if she were saying that why didn't exist for her anymore. Again, I somehow felt the presence of somebody or something else, a third thing. It wasn't only her partner, my friend and enemy, or a child that Lea and I could have together. It was the omnipresent presence of something or somebody that isn't born, whenever two people,

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a man and a woman, get close; what is born, dies, or survives from them. What marks them for a long time, invisibly and visibly.

Something in her had fled. I wanted to stop it or change it or at least lessen its effect but the light had already moved outside of her. She returned to her kingdom of shadows where she could be alone. Where there was only a single lie and a single death, connected with the only name of that one person. No one could go there to help her. Was she thinking about the people who had thrown away the possibility not to shoot, or about the people who still had a cyanide pill up their sleeve just to make sure, like Gotlieb Faber had had? Was the help of my pleasure and energy to no avail? I thought about how a woman always risks something more than a man, even if in everything else they are the same.

She had begun to distance herself from me without moving an inch, like a part of the universe, a star that first falls and then disappears; something that separates a person from the rest without taking a step. How all the people are strangers to one another and that doesn't change even for the very closest. Maybe she was thinking about what would happen if everyone, all men and women including the old people and children, had guns to shoot back with. Or was she thinking about something else? I don't know where her mind could have wandered.

"It would be a thousand to one," I said.

"Maybe ten thousand to one. You know what kind of odds the Germans have."

"You can't change some people," she said. (She really was thinking about something else.) "We all got born somehow. What can you do if it's your nature?"

"It would probably be hard for you to change that, and all a person is who doesn't shoot is a coward," I told her. "Maybe one person can stick up for himself when his back is to the wall but few do it in advance. Their nature has got to have something to do with it. Or a different kind of hope. How and for what you were raised and what things you experienced. The next place will be different for sure."

"Some things you can only answer for yourself," she said.

Maybe she was thinking about her friend in the British Air Force, or about how many more airplanes and pilots Germany had and how they hadn't brought England to her knees yet. Maybe she was thinking about the young men her age who were fighting against the Third Reich but had already fallen while she, in the meanwhile, lived on, or about the soldiers who had already been taken out of the war due to becoming wounded, crippled, blinded, or deaf. There was no end to her imagination, just like there was no end to mine.

"What are you thinking about?" I asked.

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"An eclipse," she said with a smile. "I've always been able to find the beautiful in everything so far. Maybe there's even something beautiful in natural disasters, if you live through them. Earthquakes, floods, fire. But there's not one second of beauty in what's happening here, now, to us." Could she tell why I didn't want to talk about it?

Down on the street people were pulling the first funeral wagons laden with bread and coffee substitute. They were handing out triple portions to the people who were going on the transport as always as well as to those who hadn't been added to it until last night, either because somebody was missing or they had been exchanged for somebody else. Many people would down their portions all at once and in a little while, we, too, would belong in their company along with my friend, Adler. My stomach was growling. A dozen men around the age of forty, happy that they weren't going on the transport, were strapped into hardness around their shoulders, chest, and hips; they pulled the full wagons. Among them was the Head Rabbi of Berlin, Leon Bacck, dressed in his wrinkled Sunday suit with a tie and holey shoes, who had refused to become a member of the Council of Elders and had signed up for garbage detail or the hardest work instead. Without being conscious of it, I looked for him among the men pulling the wagon.

"They would be the happiest if we all killed ourselves by our own hands, like Gotlieb Faber," she said. "That's the last choice that they leave you: to decide your own just desserts. They humiliate you with your most secret and private longings. They show you that one way: the east. Whatever else they don't make a point of allowing is forbidden."

"There's fog," I said. There was nothing more to explain. Everything had been revealed to the bone. I saw mist in her eyes.

"Yes, there's fog out there. Helpless people, a helpless God. I always suspected that our God wasn't as omnipotent as we'd like him to be and how I'd like him to be. It's all just one big murder—and nobody is stopping it from happening. Maybe not because they didn't want to. People are as helpless as their God. Maybe that's the only thing I know for sure. It's sitting in front of my face like an open window. I can see it well. There's fog everywhere—you're right. Everything is shrouded over. There's only fog, fog, and more fog."

That was the last thing that she said. The word "fog" repeated three times encompassed her eighteen-year-old life; her gravity, beauty, and passion; how she had been happy—if only for a little while—and how she was immutably sad; it was a thousand kinds of darkness, shadows, of all the seasons, every day and night; what she had borne and thought about, when and how a person was free and what it meant; how a path

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turns and trails off or disappears, where it's headed; how everything did or didn't make sense; her open window that she only saw fog through; the words that a person resorts to and is afraid of; and how a woman or a girl fights with fate like the best man does. How she can be happy or strong in a moment, like a tree that grows, a blossoming flower or a river before it pours into the sea. And where the end — of everything — begins.

And in the end, the fog rolls in again. What become of women many times, either with their consent or against their will, or the combination of the two, in a day, a night or a minute, even though the rest of their lives are branded by doing so, and why most likely the first thing women insist on of all is the right to do what they want with their bodies, regardless of the circumstances or how they fight with it. How they demand, rightly, that it is their body. How each person in the world controls his own life — at least in some small way — or a piece of his life, his fate, or a fraction of it, and how that something isn't possible to direct without repercussions. It was something that people try to understand about each other and only manage to rarely, if ever. It's what changes people and the world for the better, or the worse; what changes them for the better or worse by what they will do or what they dare to do.

Farewell had spread through her without saying goodbye. She had lapsed into an invisible darkness. A silence more quiet than quiet. I was only one of the many men in her short life. On the other hand, what had happened between us hadn't been an ordinary or everyday kind of thing. I sense how it was that she was beautiful, in spite of everything, by what she still believed in at this last moment and by what she didn't.

That was all there was to our parting. What she had said came back to me: that a person will do anything when there's nobody watching. And what Vili Feld had said and Lea had repeated: that nobody knows who his master is and what that meant or didn't mean. And what disappears in us before we disappear ourselves. And how we ourselves drop out of everybody else's lives. She was already standing in the full light of the window. She turned the key in the lock and put a red ace of hearts in my hand. I thanked her. The morning light streamed over her. The rays of the early sun danced in her hair and over her skin. She looked like she was going to dissolve in a moment with her white complexion in the white skirt with buttons down the front.

The sky was already clear to the north, just like it was to the east. The wind was blowing the few smudges of clouds that were left from last night on to the west.

There was an eagerness in her eyes like there had been in the beginning that I didn't know how to interpret. Her breasts were trembling — and the look in her eyes said that everything was futile.

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I left her by way of the back entrance, along the locked troughs with the rain water people washed in sometimes, and which Lea of Leuwarden never came or went through because, according to her, it brought bad luck. I could get to the broken-down walls between blocks up to the number 1,218 by way of the courtyard and shortcuts. Adler would already be waiting for me. I avoided the streets that were watched. Before I went around the troughs and the latrine I heard somebody turning a big house key in the lock, and the gate closing before it slammed shut.

The old people in the hall were asking Vili what was going to happen. I could tell it was him by his voice. Had all the rain cars come? Were they only cattle cars or personal ones too? No? Yes? They always dispatched the trains on time. All that was left from yesterday's rain was dampness and mud. The fog was dispersing quickly. The sky was clear blue and the sun was giving off rays of gold; the wind had brought to mind everything that lasted forever and at the same time was fleeting. The mountains in the distance, the narrow rocks, trees and fields, the stones. The small islands of poplars standing in their rows. It was a land older than its people, impassive and independent of their desires, and otherwise more beautiful than they were. The straight streets of the fortress were in front of me. Day had come.

I happened to find out what Vili had been doing that night in the Central evidence building. He hadn't made it to the main room. The Council clerks who answered to the Commandant for the transport had made sure that the boxes with the registration cards were kept under surveillance. The leaders already knew that only the people who were allowed to live had a chance in the east—a chance of ninety-one days and odds for survival at one to twenty-nine. In order not to spread fear, despair, and panic they kept it to themselves. They couldn't do anything for the victims anyway, even if they knew who was going. It was only a question of time before they themselves would be in line and the leaders would become the same victims with the same chances for survival. Death was the big equalizer. The time that one person would prolong to the detriment of another person was what wasn't fair; friends and strangers, men and their wives, old parents. That's why there were so many prostitutes, because nobody wanted to commit themselves to anything. It was a lost night for Vili. Nobody had been allowed on the streets until six in the morning. He had slept in his clothes, with his shoes off on a bench in the hall for people when they waited for their papers to be sorted out on the third floor of the Magdeburg barracks. He already knew that nobody would be sent in place of himself or Lea from Leuwarden. Rabbi M. had locked himself in a flat for the prominents with his

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Hungarian wife so that nobody could come looking for him and want something. He had too many friends among the men and the women being sent on the transport. And Commandant Rahm had insisted that the wheel of fate turned fairly—at least in his Nazi terminology—so that nobody would be left out from those already called up for the transport. That certainly didn't have anything to do with fairness. In addition, he had a special fondness for exact numbers and demanded responsibility from all the members of the Council of Elders from the first to the last. Just like the people in Berlin kept an eye on him and the Jewish representative in the fortress. Rabbi M. didn't intend to risk his battered safety for even the more fragile safety of someone else. The clash of interests in two attempts for safety ended up being dangerous. He didn't care what the office workers thought of him. What mattered to him were the *people at the SS headquarters. His life depended on them. The workers* in the office could only complicate things.

Adler didn't ask me about anything. He didn't want to go on the transport by himself. He was happy that I had come in time, if pale after not having slept, with circles under my eyes. My whole body was hurting. I didn't even sit down. We picked up our things bound in the brown margarine boxes and hung our transport numbers around our necks. I had number 63.

"Yeah," Adler said a little later, as if he were answering me or throwing something back in my face. "You never did get hung up on little things."

"No," I said.

"We'd better go if we don't want to miss it," Adler said. Nothing more. Then we went up to the train station which cut across the center of the fortress along L Street, the longest avenue in the fortress that cut like a knife deep into its belly and ended in a pair of silver tracks.

"You still want to make everybody happy?" Adler asked.

I had stopped talking to him. He hadn't even asked me if I wanted help with my box.

"How are you feeling?" he asked finally.

"I'm fine," I answered. "How about you?"

"Good. How could I not be?"

We got in the same wagon with Vili Feld. Nobody felt like talking. Everything that had ever happened was already over. The first thought on everybody's minds was where we were going and what was going to happen. Everybody was asking themselves their most secret question: am I going to make it like I survived the fortress or in some other camp before Terezin? Am I ready to live at the suffering of somebody else, instead of someone else, or at somebody else's expense? Am I willing to swallow my own heart so that my legs don't shake and fall under me the

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moment my own fate is decided? What will happen, will happen. What awaits us awaits everybody.

On top of everything, everybody was exhausted. The wheels of the rain periodically banged up against the connector along the track. Sometimes the tracks would shift slightly and the train would jump like we were traveling through empty air or across a deep pit. Being quiet and resting simply meant gathering strength for what was to come. The direction to the east could only augur bad. It was either luck or bad fortune that nobody knew anything for sure. Even with the changes in tracks and pauses, the train kept heading in the same direction. The track was a funnel that the whole world, the time and the meaning of everything gushed out of. Endless ties of rail. The world disappeared behind us with every turn of the wheels.

Men and women traveled separately. Two thousand five hundred men, two thousand five hundred women. Fifty wagons, two engines, one in the front and the other at the end. The women that had been convicted of something while they were at the fortress, from petty offenses to theft or disturbing the peace through fights or arguments with other occupants, or among themselves, Bible-toters and such, all rode in the first three wagons. They crammed a hundred of us into a freight wagon for forty men or eight horses. We got a place above on the top of the suitcases under the roof of the cattle car. A little light and air made their way through and one night when it rained a few drops of rain came in by the little wire window. People in the middle and down on the bottom of the car almost went mad from being crushed. They didn't have any light or air, they only hampered on another. Everybody handled it the first day and night. By the second day and night, they loathed one another. They beat a man who had dared to say that Adolf Hitler had an unknown grandfather whom his grandmother from his father's side, Maria Anna Schickelgruber, never talked about and who was thought to be either Johann Nepomuk Hiedler or his brother, Johann Georg Hiedler or a Jewish businessman from Graz by the name of Frankenberger or Frankreither.

We longed for each other's deaths. We traveled three days and four nights. We didn't have any place to go to the toilet. It was the worst for the people under us. I thought about the marathon runners that Adler claimed later on pissed in their pants so they wouldn't lose time. Ours was a ridiculous race or trip where the participants got to the end and then died. The last place we stopped was in Krakow for a whole night. Other trains came in and went out on the track next to ours; the wheels would screech and the whistles would blow. The local announcer would call out departures to Berlin, Warsaw, and Sophia, to the icy seaside in

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the North and Danzig. It sounded like a song. Her voice was full and rich. It carried like a dream throughout the train station, sensuous, beautiful like the fleetingness of the stars and at the same time it was hard like the earth, the changing of the seasons of the year, the nights and days. Then the announcer called out the stop of the train to Hamburg-Altona with layovers in Dresden, Leipzig, or Oberhausen, Bremen, Frankfurt, and Wuppertal. The secret of a young womanly voice flavored the words. It spoke of a world that other people had been born to, the right ones, from the right mothers and the right fathers. It carried a different spontaneity, a different freedom, anticipation, and expectation.

When we reached our final destination of Auschwitz-Birkenau they didn't even sort through the people in the first three wagons where the convicted women were, where Lea from Leuwarden was. From the first to the last, the women went from the ramp down the alley between the Waffen SS with their dogs on leashes—pregnant, sick, guilty, or innocent—and straight to the furnaces. Most of them didn't have a clue where they were going or could only have guessed. Some of them stumbled on the tracks. In twenty minutes they would be poisoned and suffocated on Cyclon B and shoveled into the ovens. Nobody buried the dead. By nightfall, ash was all that remained of any of them.

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JOHN UPDIKE

Icarus

O.K., you are sitting in an airplane and
the person in the seat next to you is a sweaty, swarthy gentleman
of Middle Eastern origin
whose carry-on luggage consists of a bulky black briefcase he
stashes,
in compliance with airline regulations,
underneath the seat ahead.
He keeps looking at his watch and closing his eyes in prayer,
resting his profusely dank forehead against the seatback ahead of
him,
just above the black briefcase,
which if you listen through the droning of the engines seems to
be ticking, ticking
softly, softer than your heartbeat in your ears.

Who wants to have all their careful packing—the travellers'
checks, the folded underwear—
end as floating sea-wrack five miles below,
drifting in a rainbow scum of jet fuel,
and their docile hopes of a plastic-wrapped meal
dashed in a concussion whiter than the sun?

I say to my companion, "Smooth flight so far."
"So far."
"That's quite a briefcase you've got there."
He shrugs and says, "It contains my life's work."
"And what is it, exactly, that you do?"
"You could say I am a lobbyist."

He does not want to talk.
He wants to keep praying.
His hands, with their silky beige backs and their nails cut close
like a technician's,
tremble and jump in handling the plastic glass of Sprite when it
comes with its exploding bubbles.

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Ah, but one gets swept up
in the airport throng, all those workaday faces,
faintly pampered and spoiled in the boomer style,
and those elders dressed like children for flying
in hi-tech sneakers and polychrome catsuits,
and those gum-chewing attendants taking tickets
while keeping up a running flirtation with a uniformed bystander,
    a stoic blond pilot—
all so normal, who could resist
this vault into the impossible?

Your sweat has slowly dried. Your praying neighbor
has fallen asleep, emitting an odor of cardamom.
His briefcase seems to have deflated.
Perhaps not this time, then.

But the possibility of impossibility will keep drawing us back
to this scrape against the numbed sky,
to this sleek sheathed tangle of color-coded wires, these
    million rivets, the wing
like a frozen lake at your elbow.

New Orleans

Fruit of a French scam, the New World being
one big get-rich-quick scheme, it sank its bricks
in Mississippi mud; the first dry row
received the wood of columned Greek revival.
The whores in Storyville were kept in cribs
like pigs, naked and doomed. The yellow fever
wiped out one third the populace each summer,
but there were always more, both slaves and masters.

Now good times are the commodity marketed,
not cotton, indigo, molasses, rice.

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On Bourbon Street the modern pickaninnies
tap dance, but sullenly; the strip joints hawk
that quickly spoiled crop, flesh, night after night,
and bad rock outshouts jazz's gracious ghost.

JENNIFER MICHAEL HECHT

Gods and Animals

Call it solitude. Only Gods and animals,
Aristotle said, can live alone. Nietzsche chided:
Also philosophers, who are a bit of each. Of course,
these days you root around a lot, bestial from the lack
of being seen. You look out of the windows
with wide, immortal eyes. But this is still

humanity, I think. Why let it end? Loneliness
for one, but what is that: The lack of a mood
swung at you; the lack of a common tongue?
Six of one. The Works Cited list is often better
than the text. Oh yes, the bliss of a common
fate. Yet what is fate nowadays, but familial

role: that from which one tries to break away,
and fails. Why bring in players and recreate it all at home?
The oracle sends you into therapy in hope you might
avoid the written word. But how far do you really think
you're getting? You animal. You god. Arrange
your bedding. The police are at the door.

Put away your pornographic coasters;
let their drinks make condensation rings.
So these are the decisions you are making?
The Gods sleep all day. The animal eats
anything, the animal sleeps all day, emerging
in the night. Aristotle also sleeps all day,

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but he is under stars who have souls. The nights
are bold soliloquy. The nights are oil paint
and ink. Having lost something, loneliness picks
through its garbage with a barge pole, unwilling
to get too close. So these are the decisions
I am making? Call it gratitude, I like to be alive

here in this railroad apartment hovering over
eternity. Fate might at any moment bring human
voices to your window. Fate might lift the roof
and move your solitude aside with a weird and human
joy. But here you ride your whim. You can flex
your lecture. Here you can bark at your stars.

ROLF DIETER BRINKMANN

Artificial Light

We have pictures which
"move," and the meaning
is not only something which is

very bright. There are, for example,
light bulbs, which disappear in
the darkness, and there is

this pattern of auto accidents
and "angst." A boy lies
stretched out naked on the

ground, beneath a huge
brightness and "moves"
his hand. This boy is

me. The meaning of
such a scene is simple.
As though in the memory

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just this single "picture"
was real. I "did" that
and later, when I was finished

just this "movement" remained.
Seen too closely, the details
disappear and become "angst."

Translated from the German by Mark Terrill

SOPHIE CABOT BLACK

The Climb

I will be done with mountains. Let
The subsequent come, the fallen stone.
Let blazes heal, let erosion. Having marked

Certain places, it becomes easier to rest
On the way back down. What name to leave
This flower (or keep nameless), what small rock

To bring back to where I will write you
Of how it was, getting whatever remained
Up to the place we thought highest. The mountain

Does not move; nothing I can say
Will move it. Beyond are only more mountains
Conspiring as if to break free. And I could not hear

For the noise of breath; each finger uncurled
And one blue flower where trees refuse to live.

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Ever Permitted, Never Ready

READY OR NOT: WHY TREATING CHILDREN AS SMALL ADULTS ENDANGERS THEIR FUTURE—AND OURS. By Kay Hymowitz. Free Press. $25.00.

I KNOW AN EXTRAORDINARILY BEAUTIFUL fourteen-year-old girl who turned up one day with a gold earring inserted through her tongue. When I asked her if punching a hole in her tongue had not been very painful, she shrugged. When I asked her what had moved her to have such a thing done to herself, she shrugged again.

To be sure, the shrug is an indispensable piece of body language for any fourteen-year-old being confronted by an inquisitive adult— even, or especially, an adult who is fond of her. But in this case, I don't think that shrug was intended for me as much as it was for herself: she did not actually have an answer.

Nowadays all over the American middle class are to be found children just like her who are in one way or another mutilating themselves. You see them everywhere, with rings in their tongues or brows or navels or God-knows-where, or with tattoos on their tender breasts or buttocks. In some cases the self-mutilation takes the form of starving themselves into a dangerous state of emaciation. To say, as some sociologists have, that such behavior is a symptom of the terrible force of conformity to fashion—such as might have been dictated to them by television, for instance—seems to me to be getting at the question back-to-front. Obviously, there is no more powerful force of conformity than that governing the style and behavior of adolescents: one false move, as the gangsters used to say, and you're dead. But after all, the kids of whom I speak are not merely flouting authority, or even flouting it at all; nor, on the other hand, are they merely imposing some expanded form of dress code on one another: these are the healthiest and hence the handsomest kids who have ever lived, and they are *mutilating their bodies*, for God's sake. And neither they nor we know why.

Kay Hymowitz, however, has taken the first genuinely enlightening stab at an answer in her new book *Ready or Not*. One finds it hard to describe in strictly professional terms just what it is that Mrs. Hymowitz practices. She has all the requisite university degrees, and her book gives evidence of an enormous amount of research; but to think of her primarily as a working social scientist seems somehow off the point, at least in this instance. She is a member of a new group of social observers ("scientists" doesn't make it) whose work, punctilious as it may be

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about paying attention to carefully collected data, is meant to achieve, and confessedly so, a very large social transformation.

This transformation, simply put, is the return to a once-again vital and powerful American family, where mothers may be distinguished from fathers and where children may fully be the wards of both. And Kay Hymowitz's particular contribution to this general project is an attempt to answer the question with which I began, namely, what in God's name is going on with a cohort of children who by some reckoning may be thought the luckiest since the world began and who yet seem to be caught up in some kind of frenzy of self-hatred.

Her answer is that they are, against both their wishes and capacities, being required to bring themselves up. The term she uses to characterize the dispensation under which they are being both reared and educated is "anticultural." What she means by this is that both at home and at school they are being instructed about life and about the world by the adults who mean to impress upon them that little or nothing of the past has any value to them.

It goes without saying that the children of whom she speaks are the offspring of the baby boomers, who appear to imagine that they did indeed make a revolution in the sixties and seventies, and that in their footsteps all has been made new. Thus by implication their children are happily and creatively on their own in a brand new world (an idea made all the more plausible by the sight of all of them, from toddlers on up, totally at home and at peace, fingers flying, in that place of a limitless future known as the cyberworld).

There is no question that in the two decades of the 1960s and 1970s, collectively known as the Sixties, much of the old ethos had collapsed and much had been made "new." Women, for instance, were figuratively and often literally storming the streets; marriage and childbearing were beginning to be put off until some mythic "later," while sex seemed to be ever freer (if in truth no easier); and among other signs of liberation there were people, among them judges and lawyers, who were ever more successfully invoking something called children's "rights," both legal and moral.

Such "rights," however, could soon be seen—by anyone, that is, with eyes to see—to have far more to do with the abdication of responsibility, at least on the part of parents and teachers, than with any newfound sense of justice. Kay Hymowitz quotes, for instance, from an article by one Hillary Rodham, published in 1978 in the *Harvard Education Review*, in which she said, "when it comes to decisions about motherhood and abortion, schooling, cosmetic surgery, treatment of

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venereal disease, . . .employment," and other matters that will "significantly affect a child's future, . . .a competent child should be permitted to assert his or her own interests." This idea is underlined in the case of parents by the recent discovery that babies are perceptive virtually at birth, which gets translated by many childrearing experts into such formulations as "the competent baby," or "the information-organizing individual," ideas whose climax was capped by two experts, Alison Gopnik and Andrew Meltzoff, when they wrote in a book called *Words, Thoughts, and Theories* (MIT Press, 1997) that babies form "a succession of theories about people and the world" which they then test by experimenting. "We can't help but be struck by how similar [infant] behavior is to the behavior we normally associate with scientists."

One might suppose, then, that these "baby geniuses" (the title given by Kay Hymowitz to one of her book's chapters) would require the most attentive upbringing and education, but one would be most seriously mistaken. For, *mirabile dictu*, such babies just teach themselves. And what they do not, or cannot, teach themselves (from the multiplication tables to American history) is no longer, in this great new world they are in the process of making, worth bothering with. Put it all together, children's "rights" and children's "genius," and what it spells, plain as day, is not freedom for the kiddies but fully sanctioned liberation for parents and teachers.

Need it be said that liberation for parents and teachers spells a kind of sapping listlessness for the young? They move listlessly, they speak listlessly, their entertainments are often listless ones, and their sexual energy is squashed and misshapen under a heavy, soggy blanket of permission. The result of this last is something to make you weep: it seems from the kids' own accounts of the matter that whenever sex threatens to rear its ugly head, they quickly move into crowd formation for safety; and when it can no longer be avoided, there ensues a kind of resigned "hooking up" (the kids' term) in which some girl will simply relieve some boy by means of fellatio.

"Anticultural" is an illuminating term for what is going on with America's young, except for the fact that something is missing from it. And that is, that these neglected children—which is after all the plain brutal term for it—are themselves the offspring of a generation of neglected children. The idea that American society had no tradition of any value to hand on to its young was one that reached full-throated expression in the sixties. The baby boomers as newborns were not likened by anyone to scientists, but the idea that their opinions were an essential part of their education was already coming into full flower.

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And by the time they reached college in the 1960s they were being widely declared (even by so stern an observer as Hannah Arendt) to be the most brilliant and moral generation the world had ever seen. Those whose job it actually was to teach them, and who surely knew better, surrendered to this line out of fear; and their parents surrendered to it as well, out of sloth—and most of the young simply grew more and more enervated by their putative victory.

But at least it can be said of the baby boomers that they had occasioned a goodly amount of anxiety, whether it was given expression or suppressed. Their children, on the other hand, seem to be making far less noise and occasioning far less anxiety—so long, that is, as they remember the condoms.

Even so, from her original and truly illuminating angle of vision Kay Hymowitz has explained a great deal about the emptying of the old American ethos and the dulling of the American morale. She has perhaps even helped to shed some light on my own anxiety about the beautiful and self-mutilated fourteen-year-old I spoke of, along with all her pierced and tattooed and anorexic contemporaries who are so determinedly doing hurt to themselves. These children's mothers and fathers could once have set fires in their college libraries, say, or rolled in the mud at Woodstock, and the world had taken intense notice. Today's "baby geniuses" in their anticultural world can scarcely raise a murmur—except perhaps by smoking cigarettes (and even in that case the politicians and their minions are cheerfully planning budgets based on the taxes that smoking children can be expected to pay).

But who knows? Maybe one day (may it be soon) Kay Hymowitz and associates will have begun to make a dent. And maybe, again, on that day my young friend's father will finally stop dead in his tracks and shout at her, "My God! What the hell have you done to yourself?"

Midge Decter

The Americanized Psychoanalyst

IDENTITY'S ARCHITECT: A BIOGRAPHY OF ERIK H. ERIKSON. By Lawrence J. Friedman. Scribner. $35.00.

SPORTING HIS "POST-MODERN" COLORS, Stanley Fish in a recent op-ed piece declared: "All that biographers can do is to substitute their own story for the story of their announced subject" because "all biographers

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are all autobiographers, although the pretensions of their enterprise won't allow them to admit it or even see it." Fish allows no room for narrative interpretation and explanation; only simple facts about birth, marriage, and death escape his subjectivism. The half-truth in his dogmatic skepticism is that biographers are attracted to writing about their subjects for reasons both explicit and implicit. But the poverty of Fish's idea is pointed up by the success of Lawrence J. Friedman's biography of Erik H. Erikson, which is a richly informative examination of a complex person, always sensitive to his familial, professional, and political contexts, and appropriately appreciative as well as critical of his work.

Friedman joined the early "psychohistory" movement but became disenchanted when too many participants "failed dismally in their historical judgments and their aesthetic sensibilities." He does not thrust himself into the story, acknowledging only in a footnote that as "a red diaper baby," who had tried as a student to sue the University of California for suppressing communist speakers, he might be "too harsh" in his criticism of Erikson's role in the loyalty-oath controversy in 1950 at the University of California, because he opposed one oath on principle as a form of "official truth" and resigned his full professorship in psychology; yet he seems to have signed a somewhat similar one in order to stay on for fifteen months in an institute affiliated to the psychology department. Friedman also mentions prefatorially that a friend's delayed recovery from a life-threatening illness influenced the shape of his story by making him more aware of both triumphs and tragedies in Erikson's and anyone's life. Perhaps that accounts for the relentless chronicling of his physical decline in old age, which gives a sadder arc to the story than it would otherwise have.

For historians like Lawrence J. Friedman (and myself), Erikson's revisionism was congenial because he rejected Freudian "originology" about childhood and was always concerned about the outer as well as the inner life of his subjects. Beginning as a teacher of children, he came increasingly to focus on later stages of life, where documentary evidence is much more likely to be found, and his biographies centered on "identity diffusion" in adolescence or on issues in adulthood about "generativity" versus "self-absorption." The highwater mark of his pertinence to historians was the *Daedalus* volume *Philosophers and Kings: Studies in Leadership* (1970), with its essays on such leaders as Gandhi, de Gaulle, Bismarck, Newton, James Mill, and William James.

What little Erikson had to say about Jefferson, however, in his Jefferson Lectures (1973) seemed dwarfed by "the monumental achievement of Jeffersonian biography." Over half of the lectures were given over to

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Erikson's rambling musings on topical matters more suitable for political intelligence than for psychoanalytic sensitivity. By then he was ruefully aware that the "identity crisis" had become warped by helping "to glorify the drama of youth, with all its dangers, as a semipermanent state." That distortion was particularly ironic in light of Erikson's first essay in psychohistorical analysis, revised in 1942 after he interviewed German prisoners of war in Canada. He characterized Hitler as a gang leader who appealed to estranged German adolescents, encouraging them to believe "that the adolescent is always right, that aggression is good, that conscience is an affliction, adjustment a crime."

It is often forgotten that his early formulation of the identity crisis as a stage of development in its aggravated form—as he had experienced it himself as a wandering and wayward artist in Germany—was specific and concrete. When Dr. Howard Feinstein and I applied it to William James and his father, it meant a youth's attempt to renew and redefine identifications made in childhood but falling prey to an "overidentification" with a disturbed parent, who "out of an inner affinity and insurmountable outer distance has selected this child as the particular child who must *justify the parent*" and, by an "all-pervasive presence and brutal decisiveness of judgment," precipitates the child into "a fatal struggle for his own identity."

Friedman's subject kept pace with his own theory of the eight-stage life-cycle. The historian recognizes that as Erikson in old age struggled with its issues of "integrity and despair," he tended to substitute "spiritual evocation" for "shrewd analysis,"and his prose grew increasingly abstract. In 1975 Erikson was under wounding attack by Marshall Berman for being "the man who invented himself," charged with dropping his stepfather's name Homburger to disguise his own Jewish origin. Increasingly assailed also by radical feminists, orthodox Freudians, and neoconservatives, he paid the price for his extravagant eminence as the most publicized and honored psychoanalyst in America.

There are several interesting stories in Friedman's biography of Erikson. There is the familiar one of the Americanization of an immigrant from Germany, drawn to the New World by the political threats of the Old World and finding in New Deal America a hopeful place of freedom and personal success. There is also the complex story of Erikson's own family history. He had the mixed heritage of a Danish Jewish mother and a German Jewish stepfather. To complicate matters further, Erikson's mother falsely told him that his natural father was her deceased first husband, a fiction designed to cover the scandal of her son's illegitimate birth, and she tried to discourage him from trying to find out the

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truth. He assumed from the rumors of relatives that his father was Danish, aristocratic, and Protestant. The son's choice of the name "Erikson" not only reflected this myth of origin, but also fitted his deep interest in such Protestant figures as Luther, Kierkegaard, and Paul Tillich. It seems poetically appropriate that Erikson and Joan Serson (of Canadian Episcopalian background) met at a masked ball and were married in three ceremonies—Protestant, civil, and Jewish. He was always moving on the borders of different traditions.

There is also the story of a marriage in which the wife carries the largest share of the domestic responsibilities and is a crucial asset to her husband in his work. Friedman shows that Erikson was an absentee father, who was more successful in dealing with the troubled children of his colleagues than he was with two of his own. Part of that problem, Friedman believes, is the result of the Eriksons' mishandling of their crisis in 1941 of having a Down's syndrome child, Neil. They followed the advice of hospital authorities and their friend Margaret Mead to institutionalize him, as was often done in those days, and they pretended for some years in their family circle that this child had died. (This deception eerily replicates the deception Erikson's mother and stepfather had practiced on him.) When the son died at 22, the Eriksons, who were then in Italy, left the cremation and burial services to be carried out by the son and daughter who had been the most hurt by the way that Neil had been excluded from their family.

Friedman also lucidly chronicles the development of Erikson's life-cycle theory. Though he never cut loose from the Freudian schedule of oral, anal, and genital phases, his own autobiographical writing consolidates five of his theoretical eight stages into one and organizes his life in "decidedly non-Freudian" terms, much as Friedman does. A skeptical historian may suspect that the Eriksonian life-cycle theory is limited to modern Western societies and Erikson himself was well aware that there were some contemporary young people for whom traditional transitions had no authority and who indulged themselves in "deliberate changeability."

Friedman is taken with Erikson's "prophetic" role, when he turned Gandhi's philosophy of "soul-force" or "truth-force" into a hope for modern salvation from a technologically dangerous world. But Reinhold Niebuhr in 1932 made a much more realistic case for the virtues and limits of nonviolent resistance, prophetically observing that "the emancipation of the Negro race in America probably waits upon the adequate development of this kind of social and political strategy." Friedman also wants to credit Erikson for anticipating fashionable "post-modern" ideas about the "decentered" subject, but the attempt is

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as anachronistic as Erikson's own unhistorical efforts to identify Luther with the individualistic humanism of a later Renaissance or Gandhi's *Satyagraha* with a psychoanalytic perspective.

Friedman is on much better ground in detecting a "certain resonance with Erikson in efforts by psychoanalytic thinkers of the next generation like Roy Schafer and Donald Spence to determine what makes a personal narrative 'feel true' and convey meaning." Erikson was fortunate that when he left Vienna his wife pointed them to the Boston area, where American psychotherapy had primarily developed, under the leadership of James Jackson Putnam, a close friend of William James. Putnam became a convert to psychoanalysis when Freud visited America, and it was Putnam's daughter who gave Erikson crucial *entrée* to Boston medical circles. Though Erikson was imbued with German romanticism, cunning Clio saw to it that he became part of a vital humanistic and undogmatic American tradition, linking him to James, Putnam, and these younger analysts.

Cushing Strout

Shadowy Autobiography

THE COLLECTED POEMS OF ROBERT PENN WARREN. Edited by John Burt. Louisiana State University Press. $39.95.

"THIS IS CLEARLY AN AUTOBIOGRAPHICAL MEMORY, but Warren does not elaborate enough to identify it. . . .Another unidentifiable but clearly autobiographical allusion." So goes an explanatory note by John Burt, the editor of this massive edition of Robert Penn Warren's poetry, glossing these lines from the late poem "The Place":

> How had you ever forgotten that spot
> Where once wild azalea bloomed? And what there passed? . . .
> How,
> Alone in a dark piazza, as the cathedral clock
> Announced 3 A.M. to old tiles of the starless city, could you bear
> To remember the impossible lie, told long before, elsewhere?

In the last decade or so of his life Warren was given to repeating, as if it were a mantra, that he would never, under any circumstances, write an autobiography or memoir. In correspondence with the present reviewer

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he broke into a discussion of the problems in the manuscript of "Portrait of a Father" that we published in the *Southern Review* to assert, quite without relevance to anything else in the letter, "One thing I want to emphasize to you is that I am *not* going to write any autobiography. *Now or ever.*" But on nearly every occasion when Warren made this assertion, it was coupled with the observation that he had already done it. According to a piece in the *New York Times Book Review* of May 12, 1985, a woman once asked him politely if he contemplated writing an autobiography. Warren nearly responded before he caught himself: "Hell no—I've done that already." Had he? "Of course not," Warren writes, "but I had spent most of my adult life trying to be a writer, and had naturally pondered the subject of myself. For poetry is a kind of unconscious autobiography." In another place (the preface to a limited first edition of *New and Selected Poems 1923-1985* issued by "The Signed First Edition Society"), Warren says, "I repeat that poetry is, in a sense however deep and obscure even to the writer, an autobiography. Not, God knows, that a poem can be depended upon by a biographer, if one ever happens to come along." And this, I take it, is the point: that to render a memory so specific that it could be pinned by a biographer to a time, a place, and an occasion would be to restrict its resonance for the reader and make it inaccessible to any but those with an inside awareness of the context—someone who grew up where that "wild azalea" bloomed, someone who was in Italy with Warren when he went alone to the "dark piazza." To put the matter another way, requiring Warren to give the specifics of time and place for the azalea and the piazza would be to ask for conscious autobiography when Warren, for good reason, understood and preferred it to be unconscious.

Though he says that poetry constitutes a "kind of" autobiography, I think Warren would have agreed that it does so only if we are considering a body of poems rather than a single poem and only in quite another sense from the one that would imagine one-to-one correspondences between the facts of a life and events in a poem; and these two points are worth bearing in mind in reading his work. In an "Afterword" to *Being Here*, Warren is at some pains to explain how that volume was put together. "The order and selection are determined thematically," he writes. "The thematic order—or, better, structure—is played against, or with, a shadowy narrative, a shadowy autobiography, if you will. But this is an autobiography which represents a fusion of fiction and fact in varying degrees and perspectives. As with question and answer, fiction may often be more deeply significant than fact. Indeed, it may be said that our lives are our own supreme fiction." About each of the volumes

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of Warren's poems there is, at least after a certain point that I will specify in a moment, what might be termed a summative quality, a taking stock, as it were, of the life at this moment in it; the summation is, however, of necessity in constant change and development from one volume to the next. The German historiographer Wilhelm Dilthey once remarked that we are all of us, all the time, composing our autobiographies though we may never write one; thus any volume of Warren's poetry may be thought of as an autobiography composed at this stage in his life's progress. Many of his poems are narrative in impulse, and the same is true of a book-length sequence like *Audubon: A Vision*. But beyond these individual and collective narratives lies a metanarrative that recounts the story of the life of the poet. In readings and various other venues, Warren made it clear that for him this "shadowy narrative" began to emerge only with the volume *Promises: Poems 1954-56*, and it concluded with the long view back of *New and Selected Poems 1923-1985*. Here a vexed question arises for the editor of Warren's collected poems, one that Burt addresses in the introduction to his explanatory and textual notes. Shall an editor include all poems published at whatever time, in whatever place, by the poet, or shall he allow the poet's final vision of the shadowy narrative to determine the contents of his ultimate autobiography? Burt's choice is the former, meaning that his *Collected Poems* consists of some sixteen discrete volumes bound together as one. I suspect Warren would have chosen the latter, which would mean that had he been granted authority over his "shadowy autobiography," it would probably look not very different from *New and Selected Poems 1923-1985*.

"I thirst to know the power and nature of Time," says St. Augustine in an epigraph Warren chose for *Being Here*—and could have chosen for any volume from *Promises* on. Indeed, the Augustinian trinity of Time (to continue with Warren's habit of upper-casing the word), memory, and identity, developed so powerfully in Books 10 and 11 of the *Confessions*, are the deep subject matter throughout the poems of Warren's maturity, the dominants of his life and work. "I can't remember the names of the others who came there," Warren writes in "Rattlesnake Country,"

> The casual weekend-ers. But remember
> What I remember, but do not
> Know what it all means, unless the meaning inheres in
> The compulsion to try to convert what now is *was*
> Back into what *was is*.

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The paradoxes—the anguish and the glory of time, along with memory, its mediator, and identity, both its product and its victim—are issues relentlessly, compulsively probed in Warren's poems. Psychologists say memory develops in the child through three stages—what they term eidetic, anecdotal, and autobiographical memory. Without insisting on strict correlation, one might say that Warren's poetry avails itself of all these stages of memory, from the flashbulb image of the "earliest thing you remember, the dapple / Of sunlight on the bathroom floor while your mother / Bathed you" ("Loss, of Perhaps Love, in Our World of Contingency"), through the anecdotal recall of "Little Boy and Lost Shoe," to the fully autobiographical interchange between *was* and *is* of "Rattlesnake Country" or "Covered Bridge"—and then the memorial recovery, playing forward and back, of a single volume or of the entire *Collected Poems*.

Rereading Warren's poetry at large one is reminded of no one so much as W. B. Yeats. I don't mean in local detail, though there is the occasional echo of a phrase or two, but in the careful structuring of individual volumes, in the interplay between volumes and the progression traceable through them, finally in the unitary vision of a career embracing every sort of antinomy, dichotomy, and complexity. Warren is like Yeats, too, and only Yeats (unless we would go a bit further back, to Sophocles), in that he went on into old age from strength to greater strength, improving, deepening, and becoming richer, stranger, yet more familiar, so that some of his last poems—I think of "Mortal Limit," "Old Dog Dead," "After the Dinner Party," "Old-Time Childhood in Kentucky," "Covered Bridge," "Reinterment: Recollections of a Grandfather," "Last Meeting," "Old Photograph of the Future," and more—too many to name—are also among his best. It is not irrelevant to observe that, like *Being Here*, this final volume, *Altitudes and Extensions*, bears an epigraph from Augustine's *Confessions*: "Will ye not after that life is descended down to you, will not you ascend up to it and live?" I am strangely reminded of Montaigne by this choice of epigraph—strangely, because St. Augustine and Montaigne do not always mingle in one's thoughts—in his last and greatest essay, "Of Experience": "It is an absolute perfection and virtually divine to know how to enjoy our being rightfully." St. Augustine and Montaigne may not be frequent bedmates, but they are well and truly joined in these late poems in which Warren draws his shadowy autobiography to a climax and close and seems, with his life and work, to confirm Yeats's final insight: "Man can embody truth but he cannot know it."

James Olney

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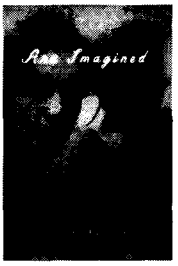

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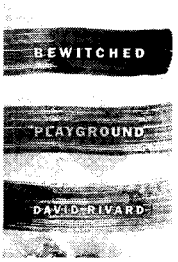

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